THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. CIX. No. 2446.] LONDON, MARCH 29, 1910. [62ND YEAR. PRICE 6d.

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GOODMAN SAFETY GAS-MAIN STOPPERS, for Shutting off Gas in Mains temporarily during Alterations and Repairs.
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For GROUND USE, FLUSH BOXES, &c. For PURIFIER BLOW-OFF VALVES.

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GAS PLANT CEMENT
For Ammonia Joints.
For Tar Joints.
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Gas Purifying Material
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PREPAYMENT METERS for Pennies, Shillings, or any other Coin.
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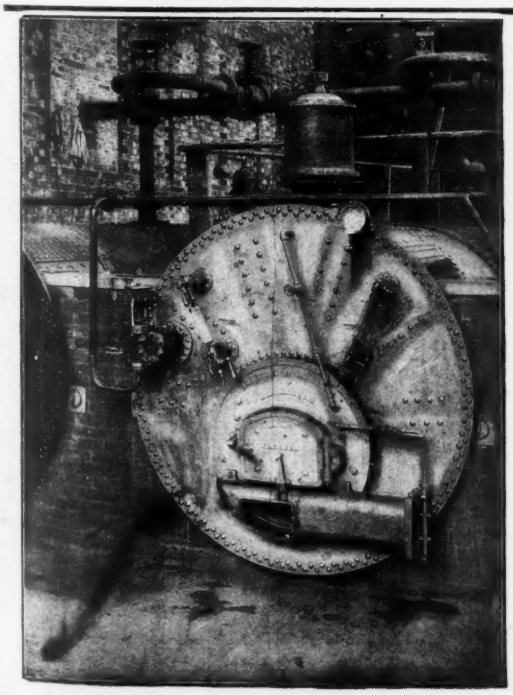

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High Efficiency.
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SAVE YOUR COOKERS.

Make them into **NEW ONES** with the

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No Experienced Labour Required.

After the Grease is removed, Stoves can be Cleaned and Polished *equal to New*. With a saving of at least **75** per cent. of the usual Cost.

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COCKEY'S PATENT

WASHER SCRUBBER & TAR EXTRACTOR.

August 1st, 1908.

"I am pleased to be able to state that the Scrubber Washer you erected at Harpenden has given every satisfaction. It has Five Chambers, and the Gas is divided into small streams, at each of these Chambers; water flows in at the top and all the Ammonia is eliminated without the aid of any other Plant. . . . The Liquor can be worked up to almost any desired strength. And the Plant has not been cleaned out since you fixed it, and has given us no trouble."

December 2nd, 1908.

"I cannot speak too highly of Cockey's Washers, they are simply invaluable. I gave full Information at the Meeting of an Association of Gas Managers, when President, at Southampton.

If you have plenty of room, I should have an Horizontal one, if short—why then a Vertical one.

The action of the Washer removes every trace of Ammonia."

December 23rd, 1908.

"You asked some time ago as to the working of Tar Extractor. I am pleased to report that it has been working for about six weeks, and is giving great satisfaction.

The whole of the Gas was passed through it for over a month, *without the aid of any other Washing Plant* (whilst the old Plant was being moved) and I was surprised at its being able to cope with the Gas so well, at this time of the year."

December 2nd, 1908.

"In reply to yours of the 1st inst., we have had Two 'Cockey's' Washers erected here, and if another was required, I should certainly put it down in preference to any other make.

It is absolutely certain in action, easy to control, and visible in working. I am sure you could not put down a better Machine. By paying proper attention to the Water supply not a particle of Ammonia passes the last Chamber.

I shall be pleased to answer any further questions on the matter, and if you like to run over and see the Apparatus in work, I shall be pleased to show you our results."

December 2nd, 1908.

"In reply to yours of the 28th ult., just to hand, I may say that the 'Cockey's' Washer was erected for the purpose of removing the last trace of Tar, and dealing with CO_2 and H_2S in the two Bottom Chambers by means of Ammoniacal Liquor, the three Upper Chambers being used for removing NH_3, intending at a later date to erect a supplementary Scrubber. *At the present time the 'Cockey's' Washer is doing the whole of the work*, and we have not found any difficulty in removing the last trace of NH_3. We have passed equal to 300,000 cubic feet per diem.

The only trouble we find in working, is a stopping up of the teeth of the Washing Hoods with Naphthalene, but these are easily cleaned by removing a Hand Cover and applying a stiff Brush. The Overflows work well, and a little attention occasionally is all that is required."

December 2nd, 1908.

"Replying to your Letter of yesterday's date, I have very much pleasure in giving you my opinion of Messrs. E. Cockey and Sons' Vertical Washer, one of which I have here (to pass 500,000 cubic feet per day).

I consider the apparatus a most valuable one, very efficient and does all the work that one can wish, leaving very little Ammonia for the Tower Scrubber to deal with.

Should you desire any further Information, please do not hesitate to ask me for it, and I should be very pleased to show you the Washer at any time you might care to pay me a Visit."

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SAML. CUTLER & SONS, MILLWALL, LONDON,

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MAXIMUM EFFICIENCY GUARANTEED.

Inspection of Working Plants Invited.

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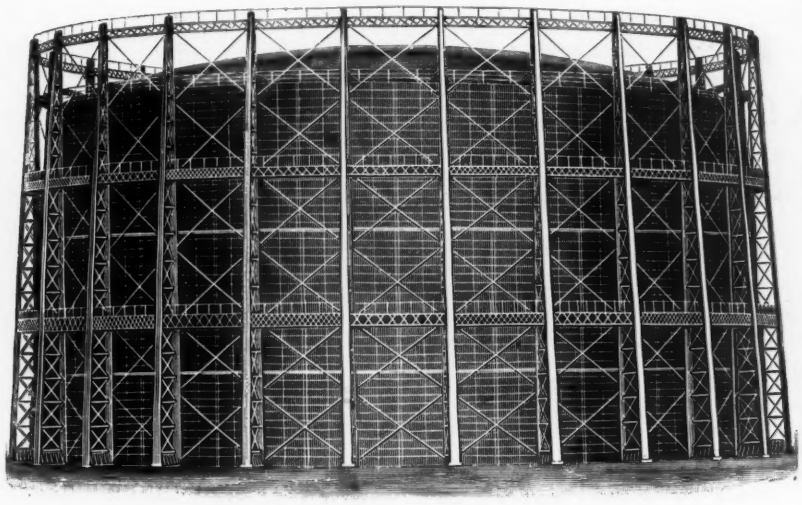

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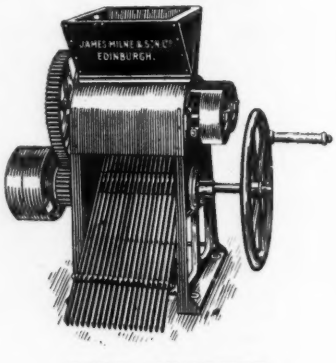
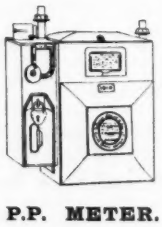


COKE BREAKER.



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The **ORIGINAL** Inverted Burners and Mantles
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Complete with "NICO" Patent Gas Regulators.

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EFFICIENCY
combined with
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Medium Size.
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"NICO" BURNERS are used and recommended by all leading Gas Companies.

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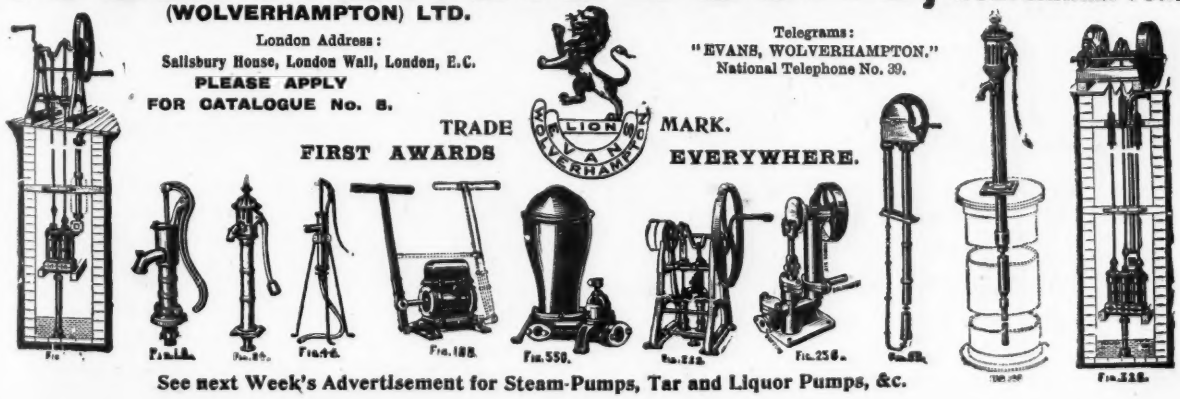

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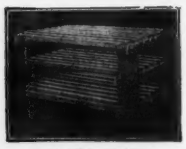
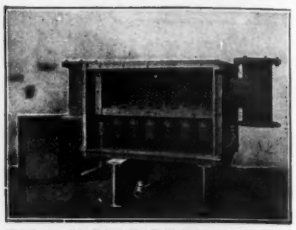


"RACK" GRIDS.



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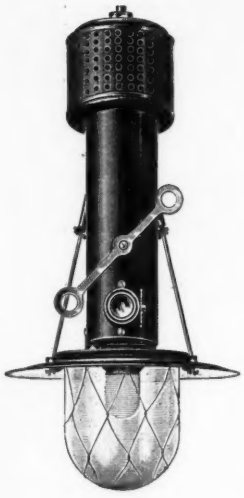

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	Cubic Feet Daily.		Cubic Feet Daily.		Cubic Feet Daily.
Aarhus, Denmark	800,000	Faversham	200,000	Perth, W.A.	125,000
Agram, Croatia	200,000	Flensburg, Sleswig	300,000	Poole	1,500,000
Alkmaar, Holland	400,000	Forst, Brandenburg	300,000	Port Elizabeth, S.A.	400,000
Allenstein, Germany	200,000	Frankenthal, Germany	175,000	Portsmouth	1,000,000
Antwerp, Belgium	1,500,000	G. L. & C. Co. Beckton	2,250,000	Posen, Germany	450,000
Antwerp (2nd)	1,000,000	G. L. & C. Co., ,, (2nd)	10,750,000	Posen (2nd)	700,000
Ashford	250,000	G. L. & C. Co., Bromley	3,750,000	Prague, Austria	140,000
Augsburg, Bavaria	425,000	G. L. & C. Co., Fulham	1,750,000	Preston	1,400,000
Aylesbury	150,000	G. L. & C. Co., ,, (2nd)	750,000	Reading	1,000,000
Barmen-Rittershausen	500,000	G.L. & C.Co., Kensal Green	2,250,000	Redhill	275,000
Barrow	300,000	G.L. & C.Co., ,, (2nd)	2,250,000	Redhill (2nd)	300,000
Bath	1,000,000	G. L. & C. Co., Nine Elms	2,750,000	Reichenberg, Bohemia	200,000
Belfast	1,700,000	Gablonz, Austria	140,000	Reichenberg (2nd)	200,000
Belfast (2nd)	4,500,000	Gelsenkirchen, Westphalia	175,000	Revel, Russia	350,000
Benrath, Germany	125,000	Gelsenkirchen (2nd)	350,000	Rhymney Valley	175,000
Berlin—Charlottenburg	2,500,000	Geneva, Switz.	500,000	Romford	300,000
Berlin—Rixdorf	650,000	Gosport	200,000	Romford (2nd)	350,000
Berlin—Rixdorf (2nd)	700,000	Göteborg, Sweden	300,000	Rotterdam, Holland	850,000
Berlin—Tegel	3,500,000	Göteborg (2nd)	600,000	Rotterdam (2nd)	1,500,000
Berlin—Tegel (2nd)	6,350,000	Graudenz, Prussia	200,000	Rotterdam (3rd)	750,000
Bilston	375,000	Guildford	350,000	Rotterdam (4th)	750,000
Birmingham	1,500,000	Guildford (2nd)	200,000	Rotterdam (5th)	600,000
Bishop's Stortford	200,000	Haarlem, Holland	850,000	St. Albans	700,000
Bochum, Westphalia	530,000	Hamburg, Germany	1,750,000	St. Gallen, Switz.	225,000
Bognor	100,000	Hampton Court	500,000	St. Gallen (2nd)	225,000
Bordentown, N.J.	125,000	Hampton Court (2nd)	600,000	St. Joseph, Mo.	750,000
Bournemouth	1,000,000	Hartlepool	750,000	San Paulo, Brazil	700,000
Bournemouth (2nd)	500,000	Hebden Bridge	200,000	Santiago de Cuba	400,000
Bremen, Germany	550,000	Heidelberg, Germany	200,000	Scarborough	800,000
Bremen (2nd)	950,000	Holyoke, Mass.	600,000	Schwelm, Westphalia	100,000
Bremen (3rd)	850,000	Hong Kong	450,000	Shanghai	225,000
Brentford	1,200,000	Hull	1,500,000	Shanghai (2nd)	225,000
Brentford (2nd)	850,000	Ilford	650,000	Shanghai (3rd)	1,600,000
Bridgwater	200,000	Innsbruck, Austria	200,000	Southampton	800,000
Bridlington	150,000	Ipswich	750,000	Southampton (2nd)	500,000
Bridlington (2nd)	200,000	Kampen, Holland	350,000	Southampton (3rd)	600,000
Brieg, Silesia	100,000	Kiel, Sleswig	1,000,000	Southgate	400,000
Brighton	1,750,000	Kiel (2nd)	880,000	Southport	750,000
Brighton (2nd)	1,850,000	L. & N.W. Rly., Crewe	700,000	Southport (2nd)	900,000
Bromley	1,500,000	Lausanne, Switz.	250,000	South Shields	650,000
Bruges, Belgium	200,000	Lawrence, Mass.	400,000	Stafford	500,000
Brussels—Anderlecht	350,000	Lea Bridge	350,000	Staines	600,000
Brussels—Anderlecht (2nd)	350,000	Lea Bridge (2nd)	350,000	Stettin, Germany	880,000
Brussels—Forest	1,000,000	Lea Bridge (3rd)	400,000	Stockholm	1,500,000
Brussels—Koekelberg	1,000,000	Lea Bridge (4th)	1,000,000	Stockholm (2nd)	1,750,000
Brussels—St. Gilles	1,000,000	Leeuwarden, Holland	400,000	Stockport	600,000
Brussels—St. Josse	1,000,000	Leiden, Holland	500,000	Stockport (2nd)	600,000
Brussels—St. Josse (2nd)	600,000	Leiden (2nd)	575,000	Stockport (3rd)	400,000
Brussels—St. Josse (3rd)	775,000	Leigh, Lancs.	350,000	Stockton-on-Tees	500,000
Brussels—Ville	750,000	Lemberg, Galicia	260,000	Swansea	750,000
Brussels—Ville (2nd)	750,000	Lemberg (2nd)	500,000	Swansea (2nd)	1,000,000
Brussels—Ville (3rd)	1,500,000	Liége, Belgium	1,000,000	Swansea (3rd)	450,000
Brussels—Ville (4th)	350,000	Liége (2nd)	750,000	Swindon	300,000
Bucarest, Roumania	1,100,000	Lincoln	500,000	Sydney—Harbour	500,000
Budapest, Hungary	50,000	Liverpool	3,500,000	Sydney—Harbour (2nd)	500,000
Budapest (2nd)	1,750,000	Liverpool (2nd)	4,500,000	Sydney—Mortlake	500,000
Carlisle	600,000	Liverpool (3rd)	750,000	Sydney—Mortlake (2nd)	500,000
Carlsruhe, Germany	500,000	Longton	600,000	Syracuse, N.Y.	850,000
Chigwell	350,000	Louvain, Belgium	800,000	Taunton	225,000
Chorley	300,000	Lübeck, Germany	400,000	Taunton (2nd)	350,000
Commercial, London	850,000	Maastricht, Holland	200,000	The Hague Holland	1,000,000
Commercial (2nd)	850,000	Magdeburg, Germany	1,400,000	The Hague (2nd)	500,000
Commercial (3rd)	1,250,000	Maidenhead	225,000	Tilburg, Holland	400,000
Commercial (4th)	2,000,000	Maidenhead (2nd)	225,000	Torquay	350,000
Copenhagen	700,000	Maidstone	500,000	Tottenham	750,000
Copenhagen (2nd)	2,500,000	Malines, Belgium	500,000	Tottenham (2nd)	750,000
Courtrai, Belgium	250,000	Malmö, Sweden	350,000	Tottenham (3rd)	350,000
Coventry	600,000	Malta	400,000	Tottenham (4th)	1,000,000
Coventry (2nd)	600,000	Manchester	3,500,000	Tottenham (5th)	1,000,000
Cracow, Galicia	200,000	Manchester (2nd)	3,500,000	Tottenham (6th)	1,250,000
Cracow (2nd)	200,000	Marlborough	100,000	Tunbridge Wells	1,000,000
Crefeld, Germany	500,000	Mayence, Germany	700,000	Utrecht, Holland	1,000,000
Croydon	1,250,000	McKeesport, Pa.	500,000	Utrecht (2nd)	1,000,000
Croydon (2nd)	625,000	Merthyr Tydfil	300,000	Verviers, Belgium	1,000,000
Croydon (3rd)	625,000	Middlesbrough	1,250,000	Vienna	3,500,000
Croydon (4th)	550,000	Namur, Belgium	175,000	Vienna (2nd)	2,500,000
Debreczin, Hungary	100,000	Nelson	400,000	Waltham	400,000
Deventer, Holland	150,000	Newburgh, N.Y.	600,000	Wandsworth & Putney	1,800,000
Deventer (2nd)	200,000	New York	5,200,000	Watford	300,000
Dorking	150,000	Nictheroy, Brazil	250,000	Watford (2nd)	350,000
Dublin	2,000,000	North Middlesex	150,000	Wellington, N.Z.	350,000
Dublin (2nd)	2,000,000	North Middlesex (2nd)	200,000	West Bromwich	550,000
Dublin (3rd)	650,000	North Middlesex (3rd)	75,000	West Ham	1,500,000
Dundee	1,500,000	Norwich	1,000,000	West Ham (2nd)	800,000
Dunedin, N.Z.	150,000	Norwich (2nd)	300,000	Weston-super-Mare	350,000
Dunedin, N.Z. (2nd)	275,000	Norwich (3rd)	500,000	Weston (2nd)	350,000
Durham	200,000	Nottingham	1,000,000	Wexford, Ireland	100,000
Düsseldorf, Germany	1,000,000	Nottingham (2nd)	1,000,000	Wiesbaden, Germany	850,000
Eastbourne	1,250,000	Nuneaton	125,000	Winchester	225,000
Edinburgh	2,000,000	Oberhausen, Germany	175,000	Winchester (2nd)	125,000
Epsom	225,000	Oldenburg, Germany	200,000	Wolverhampton	1,500,000
Epsom (2nd)	300,000	Ostend, Belgium	100,000	Zwolle, Holland	200,000
Falmouth	150,000	Ostend (2nd)	200,000	Zwolle (2nd)	200,000

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EDITORIAL NOTES—GAS, &c.

London Gas Companies' Accounts for Last Year.

IN another part of the "JOURNAL" will be found our tabular statement of the accounts of the three London Gas Companies for the past year. It differs somewhat from its predecessors, inasmuch as items in the accounts which were formerly grouped have been separated, and the table of increases and decreases is dispensed with. It will be seen that the total capital, including premiums, engaged in the supply of gas on Dec. 31 last amounted to £38,424,921, compared with £38,436,874 at the close of 1908—a reduction of about £12,000. The total income was £6,733,207, against £6,848,146; and the expenditure £4,928,033, against £5,122,076. The gross profit was £1,805,174; being at the rate of £4 14s. per cent. on the capital, and £37 12s. 5d. per cent. on the total gas-rental. The figures for 1908 were £1,726,070, £4 9s. 10d., and £35 18s. 6d. The second table, giving the results of working out the items in the preceding one on the basis of each 1000 cubic feet of gas sold shows that the Gaslight and Coke Company stand the highest, and the South Metropolitan Gas Company the lowest, in the matter of capital outlay, income, expenditure, and gross profit; but, with the one exception of the capital, the figures are very close. Taking the mean of the three Companies, they are: Capital, 20s. 0·84d.; income, 3s. 6·2d.; expenditure, 2s. 6·89d.; and profit, 11·31d.; the figures for 1908 being respectively 20s. 6·84d., 3s. 7·98d., 2s. 8·89d., and 11·09d.

The following table shows the carbonizing results of the three Companies, so far as they relate to the manufacture of gas from solid raw material only; and a noteworthy feature is the further increase in the quantity of gas produced in the case of each Company. The mean make per ton last year was 11,405 cubic feet, compared with 10,939 and 10,885 cubic feet in the two preceding years.

TABLE *showing the Residuals Produced and the Gas Made per Ton of Coal by the Metropolitan Gas Companies in the Year* 1909.

Name of Company.	Coke.	Breeze.	Tar.	Am. Liq.	Gas.
	Cwt.	Bushels.	Gallons.	Gallons.	Cub. Ft.
GASLIGHT AND COKE .	12·65	4·86	10·09	31·82	11,329
SOUTH METROPOLITAN .	12·36	4·69	9·86	38·25	11,499
COMMERCIAL	12·25	5·72	12·03	37·05	11,493
Mean per Ton . .	12·52	4·86	10·13	34·61	11,405

Lighting and Extinguishing Interior Burners.

WE hear in these days much regarding the greater convenience of electric lighting than of incandescent gas lighting—the alleged greater convenience resting solely in the fact that the light can be produced and extinguished by merely operating a switch. If the allegation were true, it is, as Mr. T. J. Litle, jun., points out in an article in our American contemporary the "Illuminating Engineer," more than countervailed by the weaknesses of the electric light. But that the allegation is untrue is seen by the synopsis that Mr. Litle gives of the various systems of lighting and extinguishing gas for interior gas illumination. There are the several forms of catalytic lighters, which render gas self-igniting—the small spongy platinum pills caught in the mantle mesh in the direct path of the gas, or used for igniting a pilot jet, or the modification whereby a small electric current is employed to activate the material up to a point, and then let the gas do the rest. This last-named system is not generally known in this country; but Mr. Litle regards it as the most promising among the catalytic igniters. Then there is the pyrophoric igniter invented by Baron Welsbach. But while Mr. Litle does not at the present time consider this system commercially successful, there is no doubt from what he says subsequently—inasmuch as it has the advantage of not requiring any special wiring or pneumatic tubing—that he looks hopefully upon it as becoming eventually a practicable system. Then there are the pneumatic, the Norwich, and other methods, in which a pilot light has to be maintained at each burner. The constantly burning pilot light, except in certain situations, though only a modest amount of gas is consumed, is no doubt, in a minor degree, wasteful; but, on the other hand, there is the question of reliability of ignition to be considered. The various forms of electrical ignition and extinction have their attractions; but there has had to be considerable work upon them to secure reliability. The systems that will continue the most successful are those in which the sparking or incandescing points are removed from the direct path of the upward current of heat and products of combustion. This rapid survey of the means for internal lighting on the self-lighting and switch principles shows that the special convenience claimed for the electric light is not a peculiar attribute that has not its equals in connection with incandescent gas lighting. But we are faced with this fact, that although these systems for the automatic lighting and extinguishing of gas are offered to the public, and at a comparatively inexpensive rate, the public largely ignores them, and continues to apply the same means of ignition to the incandescent gas-burner that their parents did to flat-flame burners. The strength of custom is peculiarly great. The cost of fitting up these systems is only moderate. Nevertheless householders who rent their dwellings will think twice before they incur the expense; and certain it is that the poorer householder will stick to the match as the preferable means of ignition. In the better class houses, one or other of the systems stands a better chance; but even in these houses, custom retards application. If the tenants of more of such houses could be induced to have trial installations, extension would follow. There are people who like novelty; and must have it if they find the demonstration of its utility at a friend's house. In these matters, however, it is the start that is the greatest difficulty.

Works Transformation.

IT is interesting to reflect on how advances made in gas-works plant have not only been progressive in producing economy and other results, but have assisted in altering, in a remarkable manner, the facial appearance of works. The gas-works of to-day are altogether more imposing than the works of a bygone time; and this is not due so much to the accretion of business, as to the changes in plant and method. Had there been no change in the latter, the extension of business would merely have meant an augmented aggregation of old types. The plain, squat, unpretentious buildings in which carbonizing plant used to be housed, have given place to buildings of greater height and improved architectural features; and the character of latter-day plant has given scope (without wasteful capital expenditure) for imparting an additional air of importance to works, and has also afforded the engineer greater latitude in designing and planning his works. When carbonizing plant was on the old direct-fired and hand-worked system, and the transport of material was mainly by barrow, the engineer's limitations were such that he could not put into his works much that was attractive, and there was a monotonous similarity between one works and another. This has been changed. The antithesis of the old order exists in all but the smallest of gas-works. And the engineer is gratified in having works under his charge that afford him greater opportunity and room for the exercise of his designing, constructional, and mechanical faculties, and works of which he may be justly proud both in respect of their structural and mechanical features.

In another column, we conclude the description of some extensions that have been made at the Bromley and Crays Gas Company's works, from plans by Mr. W. Woodward,

the Chief Engineer. The descriptive article induces the thoughts already expressed. Look at the photograph of the ugly little house that was formerly tenanted by direct-fired retort-settings, and then at the same house with its side walls raised, and a little more architectural feature introduced into the design. An important building has been raised from that which was unimposing; and this has been occasioned and necessitated by the adoption of carburetted water-gas plant. Then we may take the coke plant to show how existing conditions may influence plant and method. The engineer has to, as it were, dovetail new conditions into the old. A feature of the Bromley works is the circular gantry in the yard, by means of which coke is lifted and lowered by crane and skips—a method that is found to be economical, and keeps the production of breeze down to a low point. To utilize this gantry in connection with the coke requirements of the carburetted water-gas plant, and to fit some system for the latter purpose to the facilities offered by the gantry, was a matter that gave the engineer play in design; and the results are economical handling of the coke for the generators, and an additional feature in yard equipment that increases both interest in the works and appearance as an establishment conducted on an engineering base. We pass into the house, and find an effective arrangement of coke storage bin with screening bottom, through which breeze and dust fall to a bin beneath, from which they are discharged, as required, into carts below. An opening to the lower bin also enables the generating-floor to be kept clean without trouble to the plant operatives; and in this again waste is avoided. An advantage of this separation of dirt and dust from the coke is that clean fuel is introduced into the generator, with the result that less clinkering is required, and the blowing of dust into and through the plant is reduced. In the whole of the coke-supply arrangements, simplicity, ingenuity, and economy are combined.

In the house we are further faced by a great change. On the ground space that formerly accommodated plant of low productive power stands to-day carburetted water-gas plant (in two sets) equal to a production per twenty-four hours of not much less than 2 million cubic feet; and yet there is space for a further set of equal, if not larger, size. It is, we believe, the first new installation in this country of Messrs. Humphreys and Glasgow's twin-generator plant, in which are found novel features, and a productive capability and elasticity that will be found very serviceable in these days of lower illuminating power gas. The results exceed the nominal and guaranteed capacities. The plant is compact; and in every conceivable way safety and precision in operation have been assured. There is much that is technically interesting about the plant; and not the least so is the theory to which practical effect is given in it. On all these matters, however, there is more extended information in the descriptive article. With this plant, again, there is associated a Venturi meter. The measurement of town gas is an entirely new application of the principle; and the services of the meter are of a varied order. It takes account of the rate of flow, the pressure, and the temperature, at intervals of approximately one minute, and adds the results to the counter readings. Beyond this a high-pressure system has been established for the supply of the Crays territory from the Bromley works; and in this connection are found a pair of compressors that are models of mechanical design, high efficiency, and good workmanship. So the times and requirements change; and with them the production of plant which gives the engineer scope, and adds to the technical and economic attractions of his works, and to their appearance. In all respects, gas-works are *en rapport* with the progressive tendencies of the age.

Illuminating Views on Photometry.

THE meeting of the Illuminating Engineering Society on the 15th inst. (reported last week) clashed, as usual, with a meeting of the Institution of Civil Engineers, for which clashing the Council of the latter body can hardly be blamed. Seeing that the proceedings at the meeting of the Illuminating Engineering Society consisted of a discussion of a series of queries covering practically the whole range of the art of photometry, it is scarcely surprising that there was little coherence in the debate. Each speaker had come to the meeting prepared to air his views on a particular branch of the subject; and what he said had for the most part no reference to the subject-matter of the remarks of the previous or subsequent speakers. What benefit will accrue to anyone from such discursive proceedings, we are somewhat at a loss to understand.

The President of the Society (Professor Silvanus Thompson) spoke disparagingly of the Bunsen or grease-spot type of photometer; whereas Professor J. T. Morris praised the simple grease spot, and stated that he could obtain with it quite as accurate results as with the relatively costly and complicated Lummer-Brodhun photometer head. We may remark that this is the conclusion at which the Dutch Committee on Photometry arrived, after careful research, so long ago as 1894 (see "JOURNAL," Vol. LXIV., pp. 1161, 1209). One point on which there seemed last week to be a fairly general consensus of opinion was that there is considerable difficulty in obtaining an accurate measurement of the mean spherical illuminating power of electric arc lamps, because of the flickering and rapid variations in intensity to which these lamps are subject. Professor Sumpner went so far as to say with regard to the testing of arc lamps that something was being tested which was not constant; and unless a method could be devised for ascertaining the mean spherical candle power at one measurement, he did not think it would ever be measured. This means that the polar curves of the illumination afforded by arc lamps are entirely unreliable, since they may merely portray variations in the illuminating power of the lamp from minute to minute, instead of the differences in the light radiated in different directions. Where a source of light is steady, there is no insuperable difficulty in obtaining measurements from which the mean spherical or hemispherical illuminating power of the light may be accurately deduced. Professor Morris demonstrated that this was the case by the exhibition of a diagram showing the illumination curve of the Keith high-pressure inverted gas-lamp, the intensity of the beam of which was, he said, considerably steadier than that of an electric arc lamp. It follows from these considerations that figures purporting to give the mean illumination of street surfaces by electric arc lamps should be received with the greatest suspicion, since they may indicate merely the maximum illumination which is momentarily afforded, but which is not maintained for more than a second in many minutes. The photometry of sources of light of rapidly varying intensity must always be of such an inexact and unsatisfactory character, that it is practically futile to discuss the question of the accuracy of illumination photometers in connection with arc lamps.

In regard to other speakers at the meeting, Dr. A. Vernon Harcourt was reminiscent as to the advantages of the Leeson or star disc for comparing the intensity of lights differing in colour, which disc he had found useful many years ago for determining the amount of light from lighthouses at the South Foreland, one of which lighthouses was illuminated with an arc lamp. He had found that different observers obtained concordant results when comparing the arc light in the lighthouse with a pentane standard flame by the use of a bar photometer with a star disc. Professor J. A. Fleming was aggrieved because the National Physical Laboratory had not discarded a flame standard of light in favour of large bulb incandescent lamps such as those which he had devised as secondary standards, or of the Violle platinum incandescent standard as a primary unit. It was easy for Mr. Paterson to defend the National Physical Laboratory on this score. He pointed out that the Violle standard gave such a red light that it was impracticable for general photometry, and that any electric lamp sub-standards must be rated in terms of some other standard, of which the pentane lamp—representing as it does exactly ten times the mean value of the historic English standard candle—is the best to choose. The colour difficulty, however, becomes, as was pointed out last week in connection with this work of reproducing sub-standards, very serious when the modern metallic filament lamps are under comparison with recognized standards (*ante*, p. 789). Mr. A. P. Trotter was amused at the antiquated and limited apparatus he found in technical colleges for imparting instruction in the art of photometry. There was, he said, apparatus 20, 30, or 40 years old that was all right in its time of long ago for testing gas. We are not aware that apparatus for testing gas should be any less accurate or less well-devised from a physical standpoint than apparatus for testing electric lights. We have heard that the greatest of modern physicists—viz., the late Lord Kelvin—stated that he could do better photometry with a piece of notepaper and an upturned lead pencil used to form a shadow photometer than with complex optical devices of the Lummer-Brodhun type.

We commend to the physicists and electricians who are apt to disparage the simple forms of photometrical apparatus a careful consideration of this pronouncement by one whose authority they cannot affect to despise.

Coalite Castles.

We are getting quite accustomed to the castles in the air that are periodically erected by Coalite Limited and its offspring the British Coalite Company. The usual supply of prophecy and promise was forthcoming at the adjourned meeting of Coalite Limited last Wednesday; and the stock and share market evinced its appreciation by promptly setting-back the Syndicate shares to 5¾-6 and the British shares to 12s.-13s. This was unkind; but there comes a time when people get tired of being treated to this jack-in-the-box procedure on the part of Directors, and when they set to work to draw for themselves deductions from plain facts. Any man of commonsense, after reading the speech of Mr. J. H. Smith at the meeting of Coalite Limited, can see that the concern's obligations are still so heavy that the shareholders stand a very poor chance this side of a remote period of tangible reward from their speculation, and any such man can also see that all the projects of the Company are still projects, and that they may never arrive at successful maturity. Coalite Limited is indebted to a considerable amount to the British Coalite Company; and the expenditure of the concern over receipts amounts to £7007. These financial debts have assuredly to be discharged before the shareholders can obtain any pecuniary result from their faith in the grandiose prognostications of three or four years ago. There is not much room for hope. In December, 1908, Coalite Limited had patents in 33 countries; patents for half-a-dozen other countries have now been roped-in. But what advantage are these new ones, when the Directors have not yet succeeded in disposing of the patents for France and Germany—the two countries in the best position of any to keep an eye on the trend of coalite events in England? The meandering of that trend has been one of its distinguishing features. There has never yet been a year since the Syndicate came upon the scene when the coalite plant has not had to undergo conversion in some shape or particular, until there is not the shadow of its original self standing. There has been a continual shifting of ground from the very beginning. And the financial position for the shareholders is anything but a recommendation to others, if shrewd, to essay a flotation elsewhere, though one is promised for India shortly. The opinion may be hazarded that among those who will not take shares in the Indian Company are the shareholders in the British Company. The Directors are also looking hopefully (or rather so, we gather) to the completion of negotiations for the sale of the French and German patents; and they are encouraged in this by the fact that the plant at Wednesfield has undergone further improvement, which is expected to have a persuasive influence. Change in plant has been a perennial condition; so that faith in the latest contribution to transformation has not a very sure foundation.

If anyone has been taught that there is truth in the old adage as to there being many a slip 'twixt cup and lip, it is the coalite shareholder. It was noised abroad that by last autumn the contract for the gas supply of St. Petersburg would be snugly in the hands of the coalite people; but the spring is upon us, and yet no contract. In fact, the Chairman of Coalite Limited has to confess that the chuckle was a little premature; for a fresh Commission to visit the works in this country has been appointed in St. Petersburg. Now what has caused this desire for further investigation on the part of the St. Petersburg authorities, if the coalite system was previously so near getting home? The delay, and the appointment of the fresh Commission, look ominous for the coalite people. Something must have happened, some knowledge must have reached the ears of the St. Petersburg authorities, in order to cause some hesitancy on their part; and there is reason to expect that they will now scrutinize very carefully the measure of success attained in this country in the past three-and-a-half years by the coalite concerns before they will commit the City of St. Petersburg to this, we claim, uneconomic system of gas production and supply. The Directors say they feel confident—why they should do so under present circumstances we cannot divine—that the Commission will decide upon the desirability of adopting the coalite process. The visit of the Commission to this country we do not suppose will be either secretly made or to view the coalite process alone. We have no doubt that those of our readers interested in other processes of carbonization and gas manufacture will see to it that the Commission have, at all events, the opportunity offered them of seeing the latest work of the gas industry in this country, and are put in possession of proper information as to why the industry does not now prefer low-temperature carbonization on much the same lines as were followed in the early history of gas supply.

Passing from this, however, there is one other "castle" in the air" to refer to. The Chairman grew quite eloquent as to the generation of electricity by utilizing the gas produced at the Barking plant. It is one thing to generate electricity; it is another thing to profitably dispose of it. This gas, we learn, "unfriendly critics" (it is hoped we are not so classed) have described as the Company's weakest factor; but it is going to prove itself (so it is said) "the "strongest financial link in the chain." In fact, it is going to effect "a complete revolution in the cost of electricity." And there was applause from the hungry shareholders! In their fascination and happiness let them continue for a space; for they have had enough disappointment to cause them to despair completely of their speculation in coalite.

Value of the Amman Valley Works.

Mr. Charles Carpenter, the Arbitrator appointed by the Board of Trade, to determine the sum to be paid by the Ammanford Gas Company for the derelict works of the Amman Valley Gas Company—one of the Eaton stock—has issued his award; and it amounts to £4195. The total amount of the claim was £5365. From the evidence laid before the Arbitrator, in turn, by Mr. A. E. Broadberry, Mr. Hubert Russell, and Mr. E. H. Stevenson, it was seen that much of the plant was of a second-hand order, and that portions of it were in a bad structural condition. Now that we have Mr. Carpenter's award, it is interesting to compare it with the financial statement concerning the Amman Valley Company that we were enabled to publish through the courtesy of Mr. Stevenson in our issue for Sept. 21 last (p. 752). Eaton and his promoting and contracting machinery had been able to raise from the public £13,977—just on £14,000—or nearly £10,000 more than the value the Arbitrator has fixed as the purchase price to be paid for the plant. The vendors themselves only subscribed £500 for shares, and lent the Company £950, apparently out of the plunder. The works were executed through the Eatonian concern, the Gas and Water Works Supplies and Construction Company. The payments during the life of the Amman Valley Company amounted in all to £15,095. Of this, the "contractors" took £7450; and, in addition, on buildings account £1000 was paid; for mains purchased and laid £915; and for mains purchased but not laid, £570. The issue expenses (prospectuses, &c.) are entered for £3410. On meters and stoves (though gas was not distributed) £430 was spent. Now that the shareholders of the defunct Company see the value placed upon the works by responsible Engineers, they will the better understand how they were fleeced by Eaton and his confederates.

The Crisis in South Wales.

With holidays intervening before these remarks will appear in print, it would be rash to express too strong an opinion as to what is going to happen in the matter of the acute crisis which has now arisen in connection with the South Wales coal trade. At the time of writing on Saturday, the latest information to hand was that the Board of Trade, recognizing the gravity of the outlook, had definitely intervened; and that a conference on Thursday between the representatives of the parties and Mr. Sydney Buxton, the President of the Board of Trade, was to be followed by a meeting of the parties at Cardiff on Saturday. Endeavours by Ministers to avert industrial catastrophes are always to be commended; but there is something peculiarly appropriate in the fact of the present Government striving to patch up the serious differences which have arisen through the operation of an Act for the passing of which they themselves were responsible. Time is running short; for the notices, of course, expire next Thursday. So far as the owners are concerned, there would even now be ample opportunity for a settlement of the dispute, as they have given their representatives full power to complete an agreement. But with the miners' representatives, the case is

somewhat different, as any agreement come to would have to be submitted to a ballot of the 150,000 miners affected. Meanwhile, it is said that the dispute has now virtually been narrowed down to the one question of the minimum wage and the equivalent selling price of coal. On this point, the demands of the owners are firmly resisted by the men, who, reports state, contend that they have yielded on the other two main points—the pay for work in abnormal places and the number of shifts to be worked—and that the next concession must therefore come from the owners. In view of the pass to which affairs had come, the miners' representatives asked that a special conference of the Miners' Federation of Great Britain should be held, to consider the question of taking joint action in the event of a stoppage occurring at the collieries in South Wales. Accordingly, such a conference has been arranged; and—unless in the interim anything should happen to render it unnecessary—it will have taken place by the time this note comes under the eyes of most "JOURNAL" readers. Such an intimation seems to suggest the raising once more of the old bogey "a national strike"—an eventuality which need not be taken into account, at any rate, just at the moment. A strike in South Wales would be quite bad enough to go on with. Mr. A. J. Griffiths, the Chairman of the Cardiff Chamber of Commerce, has expressed the opinion that, if there is a war in the field, it will be a long one; and he gives a good piece of advice in the remark that whatever settlement may be made should be for a long term, so that there may not be a recurrence in the coalfield of the uncertainty that has been experienced the last few years. The export figures for the district are highly unsatisfactory; and this is a state of affairs it is idle to hope will be changed while masters and men are so continually at variance. Even a strike might in the long run prove no more disastrous to trade (though it would to the miners) than an indefinite prolongation of recent disturbed conditions.

Valuation of Gas-Works for Purchase.

In another part of the "JOURNAL" will be found the report of an appeal to the Judicial Committee of the Privy Council from a decision of the Supreme Court of New Zealand on the question of the price to be paid by the Corporation of Hamilton to the Hamilton Gas Company, Limited, for their undertaking. By section 46 of the Act under which the Company carry on their operations, the Corporation were entitled, after the expiration of twelve years from the passing of it (in 1895), to purchase the "gas-works and plant" at a price to be determined by arbitration. The desire of the Corporation to acquire the Company's property having been notified, Arbitrators were appointed, who, of course, did not agree; and consequently the services of an Umpire had to be called in. He was exercised on the question of the basis on which the price of the property was to be ascertained—whether on the commercial or the structural value of the undertaking; the former being rather more than £30,000, the latter about £13,000. He accordingly stated a case for the opinion of the Supreme Court of New Zealand, whose decision was in favour of the lower amount. The Company—very properly, as we venture to think—appealed to the House of Lords, and were successful. It seems to us that their contention was perfectly reasonable—that the price to be paid to them for their undertaking should be its commercial value as a going concern, and not merely the value of a collection of apparatus *in situ* and land and buildings; or, as Lord Shaw put it in delivering their Lordships' judgment, not merely the material thing, but "the undertaking for which that thing existed." The "old iron" view of the value of the works taken by the Corporation and their advisers has been set aside; and they have been ordered to pay the Company such a price for their property as their Arbitrator considered it was worth, and, in addition, the cost of having his view confirmed by the highest tribunal in the land. It will be a lesson to other local authorities.

Meunier's Hydraulic Main Floats.

Mr. S. Meunier, the Engineer and Manager of the Stockport Corporation Gas-Works, writes in regard to the Blackburn charts shown in the "JOURNAL" of the 22nd inst., that the explanation given of them was incorrect. The chart was not taken from the hydraulic main but from the retort itself—a more difficult place to obtain such a level chart as the one shown. Mr. Meunier adds: It might also be as well to say that the retort is a through one, with no block in the centre; so that it is quite possible the good effect of the floats in one hydraulic main would minimize trouble in the other.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 890.)

THOUGH it was to be expected that, after the strain and high pressure of the preceding week with its heavy settlement and with the imminence of the Easter Holidays, the Stock Markets would lapse last week into a restful state of inactivity, these anticipations were far from realization. On the contrary, the animation and cheerfulness were almost unimpaired, and brisk business lasted right up to the close. True, the opening was quiet and somewhat languid, the general tendency was dullish, and many lines showed prices a little weaker. Railways notably were oppressed by visions of labour troubles, gilt-edged were stagnant, and Americans weak. But the Rubber hunters were in full cry. Tuesday was a little doubtful at first; but the attractions of the speculative gamble were irresistible, and, after a time, imparted a widespread contagious cheerfulness. On Wednesday, the bright tone and activity were well maintained. Government issues were steady, Railways strong and advancing, and the speculatives very fair. Thursday was quite brisk, in spite of a rapid thinning out of members, and cheerful to the end. Railways again were strong and full of rise. The Exchange then closed until Tuesday morning. In the Money Market, movements were somewhat irregular. Rates for short loans closed rather easier, but discount ruled steady. Business in the Gas Market was not active—about the average for the four days before Easter. But the tendency was good; and a fair number of quotations made advances. In Gaslight and Coke issues, the ordinary was unchanged; transactions ranging from 103⅛ to 103¾. The secured issues were fairly active; the maximum realizing from 88¾ to 89½, the preference 104¼ and 105, and the debenture from 80½ to 81⅝—a fall of 1. South Metropolitan was quiet and firm, making 121 and 121¼. In Commercials, the 4 per cent. changed hands at 106 and 106¼, the 3½ per cent. at 103, and the debenture at 81 free. Among the Suburban and Provincial group, Alliance and Dublin was done at from 86¼ special to 87¼, Bournemouth "B" at 16½ and 16⅝, Brighton ordinary at 152½ and 153 (a rise of 1), British at 44⅞ to 45⅜ (a rise of ½), and North Middlesex at 13. South Suburban advanced 1, Ilford "A" 3, ditto "B" 2. In the Continental companies, Imperial was a point higher at from 178½ to 180, ditto debenture made 94¼, Union from 98 to 98¾ (a rise of 1), European fully-paid at 24¼ and 24 1/16, and Tuscan at 9⅜. Among the undertakings of the remoter world, Primitiva changed hands at 7⅝, ditto preference at 5 7/16 and 5 9/16, ditto debenture at 99⅝, and South African at 12¼ and 12⅜.

ELECTRICITY SUPPLY MEMORANDA.

The Fixed Price Light Again—The Latest News from Newmarket—Public Lighting.

THE humorous fixed price per lamp project has penetrated to Weymouth; and it has been written up in the "Weymouth and Portland Standard" in a laudatory manner that suggests inspiration from electrical headquarters. The writer of the article has shown an extraordinary swallowing capacity; and has made the whole thing highly amusing to those with more intimate knowledge than he has. He tells us that in several places the scheme has been, and is being, worked by a Company. We should like to know the names of those several places. We are only acquainted with one, and that in the South of London. Again, we read that the Fixed Price Light Company, "in the districts in which they operate, receive proposals for wiring, in selected localities, not less than three rooms in any one house." Of course, the writer in his ignorance does not know that he ought to have written that the Fixed Price Company "would like to receive proposals" in the one district in which they would like to operate. As a matter of fact, at the recent meeting of the South Metropolitan Gas Company, the Chairman (Mr. Charles Carpenter) stated that they could only find one place that had been wired by the Fixed Price Company, and that was the Company's own show-house. This information will not be encouraging for Weymouth. The Electricity Department of the Corporation are intending to enter into this quixotic business; and we venture to think they have not before them the whole of the facts, and that if they persist they will meet with just about as much success as the Fixed Price Company in the only district in which they have aspired to operate. No one appears to want the Company's attentions—benevolent or otherwise. The Weymouth scheme is on all-fours with that which was described in the "JOURNAL" when the Fixed Price Company started their scheme—a scheme that the more intelligent electrical engineers ridicule. With all the elaborate verbiage in the article as to the provision against misuse, nothing (and the Electrical Engineer knows it) can be really effective against misuse save the presence of a meter. That lesson the gas industry learnt generations ago, when fixed prices per gas-burner were charged. It has been learnt also at Dundee, where a twelvemonth's trial has been given of the rental system in a tenement. The Electrical Engineer reports that, comparing the result with another tenement in the district using meters, it was found that, with care, the meter system was cheaper than the rental system. A return is therefore to be made to the meter system.

Although an article one-and-three-quarter columns long has appeared in the "Weymouth Standard" talking round about the

question, no definite information is supplied as to the money terms on which the lights are proposed to be furnished. We believe current is supplied to the ordinary consumers at 5d. per unit; while gas is supplied at 3s., or thereabouts, per 1000 cubic feet. At 5d. 7·2 units of electricity can be purchased by the ordinary consumer for 3s., which, calculating (using the metallic filament lamp) 800 candle-hours per unit, gives the consumer 5760 candle-hours for an expenditure of 3s. The inverted gas-lamp will give 20 candles per cubic foot of gas consumed per hour; so that 3s. worth of gas will represent 20,000 candle-hours. These figures are mentioned for two reasons: (1) The fixed-price scheme is to appeal to comparatively poor householders. (2) The figures show that, at the ordinary price, the electric light is considerably more expensive than gas-light using modern inverted lamps. The consumer using electricity on the fixed-price system has to pay a figure sufficient to meet the expenditure on the cost of wiring, lamps, and electricity, and, in addition, to pay for the renewal of metallic filament lamps, which are somewhat expensive. It is rumoured that the price will probably be 2½d. per week per 30-watt lamp, or 2s. 6d. per quarter. Ten shillings a year for a lamp that will only give about 24-candle power is a costly method of lighting! And this lamp (which it is considered will represent adequate illumination) the consumer is to solemnly swear he will only use in the evening, and during such portions of the day when ordinary occupations cannot be carried on owing to dull weather. He is also to undertake to have his apartments satisfactorily illuminated by daylight during the daylight hours. The Gas Company will be willing to show any consumer how a 24-candle power light can be obtained for more than one-third of the hours in a year on 10s. worth of gas.

There is keen competition between the Newmarket Gas Company and the Electric Light Company; and naturally they both say things which are affirmed to be true by the side on which authorship rests, and are as emphatically denied by the other side. Last year the Chairman of the Electric Light Company made some remarkable statements at the meeting of the shareholders as to the baneful effects of gas upon the health of the people. A twelvemonth has passed by, but we have not heard that the medical men or the coroner of Newmarket have been busier than usual during the interval, owing to the greater prevalence of gas lighting than of electric lighting. We had a few criticisms to pass on last year's *ipse dixit* statements of the Chairman, to which he has not replied; and it is noticeable that he steered well clear of the matter on this occasion. But this year it is a question of costs. The Chairman charges the Gas Company with extravagant statements as to the respective costs of gas and electricity; and it will not be wrong on the part of the Gas Company if they assert that the Chairman and the faithful Manager of the Company (Mr. F. A. Simpson), in representing that by electricity light can be obtained for a less price than light by means of the new inverted gas-burners, are not keeping within the border-line of truth. The Manager of the Electricity Company has made, it seems, a remarkable discovery, which is supposed to prove that all electrical men do not come within the category which, in his haste, the Psalmist labelled with a word of five letters. There is a consumer who used to employ candles in his bedrooms and cellars, gas in other rooms, and gas for a cooking-stove. His rooms are now lighted electrically; and the gas-stove continues its useful services. In this confusion of conditions, it is found that the consumer's combined electric light and gas bill for last quarter came to 3s. 7d. less than in the corresponding quarter of 1908, before electric lighting was introduced. But this does not prove anything. No information is given as to whether there is any equality between the light of to-day and a time past, or between the hours of use; nor as to whether the cooker has been doing more or less work. Many accounts can be produced by householders showing a vast saving by completely ejecting electricity in favour of gas. The Chairman of the Electricity Company, too, shows that he is able to save 2s. 6d. a year on a bill of £40 by using electricity instead of gas; but it seems that he has developed a sort of mania for switching off all lights in his house where they are not being usefully employed, and to having a house of darkness instead of one of light. So strongly has this mania taken hold of him, that he now switches off the lights mechanically whenever he quits a room, with the lamentable result that he sometimes leaves his friends in darkness. A man must have the light-economizing mania badly when he does a thing of this sort. Most electricity consumers develop a mania the other way about; and the ease and availability of the switch result in extravagance and carelessness. We must not, however, talk too much about this, as many gas consumers are now applying switch lighting and extinguishing.

The use of metallic filament lamps for side street-lighting continues to be a live topic of discussion by municipal electricity departments; and inner influences are constantly at work to get the municipal authorities to throw over the hated incandescent gas-lamp, and to adopt the most modern electrical article. But there seems to be a ruling difficulty in getting local authorities who own the electricity concerns to permit any public demonstration between inverted gas-lamps and the metallic filament lamps, because such a demonstration either ends in public approval of the former, or in the provision of street lighting by metallic filament lamps at a price that does anything but improve the financial results of the central station. There is an excellent piece of demonstration work now going on in Victoria Street, Westminster, in which flame arcs, metallic filaments, and triple-light inverted gas-burners are taking part; and the best piece of uniform lighting is, without question, in the portion of the street where the three-light inverted gas-lamps are used. Taking a perspective view, a person must have poor eyesight, or a tongue given to distortion, who does not say that there is more life in the light of this part of the street than in any other part. Going from this particular demonstration to general street lighting, there is a disposition on the part of electricians to, for cheapness, put in metallic filament lamps of too low candle power for adequate lighting; and the effect is miserable in the extreme. In Croydon there are side streets illuminated—forgive the word!—with 38-watt lamps, fixed at a height of 12 feet at an average interval of 75 yards. Such lighting as this can only produce dissatisfaction. The Marylebone Electricity Department based their estimates for public lighting on lower power metallic filament lamps than are now being used, with the result that they had to change them. Hence a statement in the last report of Mr. A. H. Seabrook, that the number of public lighting units is greater than the original estimate, owing to the decision to put in larger candle-power lamps in the more important thoroughfares. "Notwithstanding this, the average price obtained (after allowing for maintenance and proportion of capital charges) is practically the same figure as that on which the scheme was adopted." The consumption and cost figures are not given, so that one cannot precisely determine what is meant by "practically the same."

Evening Star Lodge.

The Installation Meeting of the Lodge was held last Wednesday; and after an absence from the Freemasons' Hall for five years, the members found themselves back in the old quarters, at which satisfaction was generally expressed. The year of office of W. Bro. Jacques Abady, as Master of the Lodge, was completed; and he installed his successor, W. Bro. W. A. Surridge. Bro. Cyril Davis was appointed and invested S.W.; while W. Bro. C. W. Offord (Enfield), who has been Organist of the Lodge for some years, and now takes the position in the Lodge that he would have normally occupied had he proceeded to the chair step by step, was appointed J.W. As a result of this appointment, most of the other officers of last year retained their positions—namely, Bro. W. Edgar, S.D.; Bro. E. G. Smithard, J.D.; W. Bro. A. E. Croager, I.G.; Bro. J. T. Randall and Bro. J. F. Wicks, Stewards. W. Bro. T. E. Priestman, L.R., had been elected Treasurer, and was invested; while the W.M. reappointed W. Bro. W. D. Child as Secretary. W. Bro. Walter T. Dunn, L.R., was appointed D.C.

The Chemistry of Light.

Commenting on a paper read before the American Chemical Society, by Dr. Whitney, "Engineering Record" (New York) says: There is still pioneering work for the chemist in the improvement of illuminants, besides all the outstanding collateral problems bearing on the subject. There is at least a chance that in the field of organic chemistry may be found the solution of the most important problems of light production. It is now well known, for instance, that the firefly radiates light in a manner which is highly selective—light that represents about the highest possible type of selective radiation for the purpose of illumination. Here is a task for the chemist which would mean, if successfully accomplished, not improvement, but revolution. There is good reason to believe that similar kinds of radiation appear in the organic world elsewhere than in the firefly. They are photogenic bacteria, for example, that probably play a part in many phenomena of organic decomposition. The efforts of chemistry in improving light production have been even up to the present time exercised in the field of inorganic chemistry. What organic chemistry holds for the future one can hardly venture to guess; but it is clear enough that chemical research directed toward the problems of efficient light production has possibilities of brilliant innovations surpassing anything it has achieved in the past.

Scottish Junior Gas Association.—A joint visit of the Eastern and Western Districts of the Association will be paid to the Falkirk Corporation Gas-Works on the afternoon of the 9th prox.; and the annual general meeting of the Eastern District will be held in Glasgow next Saturday.

Manchester and District Junior Gas Association.—The eleventh annual meeting of the Association will be held next Saturday, at the Exchange Hotel, Manchester, when the members will take "high tea," at the invitation of the President-Elect (Mr. Frank Thorp), at 4.30 p.m. After tea the business will be the election of officers, the presentation of the annual report, the delivery of the Presidential Address, &c. A smoking concert will follow.

Informal Meeting of Scottish Gas Managers.—We learn from the Convener (Mr. W. B. M'Lusky, of Perth) that the twenty-seventh annual meeting will be held in the Windsor Hotel, Glasgow, on Wednesday, the 6th prox., at 2 p.m., when the following subjects, to be introduced by the gentlemen named, will be discussed: "Appropriation of Surplus Revenue of Gas Undertakings to Relief of Rates and other Purposes," by the Chairman, Mr. D. Vass, of Airdrie; "Smokeless Fuel," by Mr. A. Wilson, M.Inst.C.E., of Glasgow; "Vertical Retort Carbonization," by Mr. W. R. Herring, M.Inst.C.E., of Edinburgh; and "Valuation and Income-Tax," by Mr. Alex. Yuill, of Dundee.

ACCOUNTS OF THE METROPOLITAN GAS COMPANIES FOR THE YEAR 1909.

—	Gaslight and Coke.	South Metropolitan.	Commercial.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money (including premium capital)	27,452,192 11 9	8,325,840 0 0	2,646,888 7 6	38,424,920 19 3
Income—viz.:				
Sale of gas by meter	2,904,706 3 11	1,321,791 12 8	..	..
Public lighting and under contracts	142,384 10 11	34,051 5 9	..	..
Total gas rental	3,047,090 14 10	1,355,842 18 5	395,510 3 2(g)	4,798,443 16 5
Rental of meters	57,101 6 6	76,249 8 3	31,981 12 3	165,332 7 0
Rental of stoves, fittings, &c.	235,456 14 8(a)	137,476 9 9(e)	19,596 16 9(h)	392,530 1 2
Residual products—				
Coke and breeze	513,151 13 9	302,644 7 8	57,653 6 2	873,449 7 7
Tar and tar products	88,651 9 7	65,093 12 2	14,408 5 9	168,153 7 6
Ammoniacal liquor and sulphate of ammonia	171,647 17 8	112,088 7 11	19,159 7 6	302,895 13 1
Miscellaneous, including old materials	20,237 19 5	11,417 15 7	747 8 1	32,403 3 1
Total income from all sources	4,133,337 16 5	2,060,812 19 9	539,056 19 8	6,733,207 15 10
Expenditure—viz.:				
Coal, including carriage and dues	1,073,312 10 11	700,777 1 7	186,856 7 0	2,115,879 18 8
Oil, do.	154,933 19 2	..		
Coke and breeze used in making carburetted water gas	65,748 14 8	..	..	65,748 14 8
Salaries of engineers and officers at works	29,657 8 8	27,432 7 4	4,984 0 3	62,073 16 3
Wages—manufacture	178,052 0 1	99,011 9 2	28,428 0 6	305,491 9 9
Purification	23,631 11 3	19,474 18 0	2,741 5 0	45,847 14 3
Wear and tear—manufacture	373,907 8 5	221,430 3 4	57,908 16 7	653,246 8 4
Salaries and wages—distribution	94,308 0 8	38,623 3 11	8,949 17 4	141,881 1 11
Repair and maintenance of mains and services	107,525 7 7	55,615 16 5	13,420 4 10	176,561 8 10
Repair and renewal of meters, stoves, &c.	290,521 0 8(b)	183,072 13 7(f)	41,048 19 11(i)	514,642 14 2
Lighting and repairing public lamps	40,504 14 11	5,129 1 2	4,812 4 7	50,446 0 8
Rents, rates, and taxes	297,147 12 8	91,693 5 10	25,608 14 1	414,449 12 7
Salaries—management	17,466 13 4	7,107 13 10	2,524 14 3	27,099 1 5
Collectors' salaries and commission	45,328 6 2	31,087 16 3	9,096 9 10	85,512 12 3
Stationery, printing, and general charges	28,074 4 9	24,152 16 7	5,035 15 7	57,262 16 11
Directors and auditors	6,906 6 0	5,750 9 11	2,650 0 0	15,306 15 11
Co-partnership and profit-sharing schemes	24,605 0 0	40,122 19 2	5,594 10 1	70,322 9 3
Annuities to officers and workmen	54,263 6 1(c)	15,245 2 6	2,438 13 9	71,947 2 4
Law and parliamentary charges	5,925 15 0	3,644 14 5	540 5 2	10,110 14 7
Bad debts and extraordinary expenses	34,333 15 0(d)	7,972 11 5	1,896 18 5	44,203 4 10
Total expenditure on revenue account	2,946,153 16 0	1,577,344 4 5	404,535 17 2	4,928,033 17 7
Gross profit	1,187,184 0 5	483,468 15 4	134,521 2 6	1,805,173 18 3
Do. per cent. on capital and borrowed money	4 6 6	5 16 2	5 1 8	4 14 0
Do. do. gas-rental	38 19 3	35 13 3	34 0 3	37 12 5

(a) Stoves, £89,049 0s. 11d.; fittings, £146,407 13s. 9d. (b) Meters, £121,278 7s. 5d.; stoves, £107,907 2s. 3d.; fittings, including labour (automatic-meter supplies), £61,335 11s. (c) Including £3502 15s. 3d. paid to workmen's compensation account. (d) Including £12,000 paid on account for stamp and conveyance duties, under the Company's Act of 1909. (e) Including £76,919 18s. 7d. received for gas-fittings. (f) Meters, £52,513 1s. 2d.; stoves, £63,835 4s. 2d.; fittings, £66,724 8s. 3d.; (g) £402,956 1s., less £7445 17s. 10d. for discounts and allowances. (h) Including £1113 9s. 7d. for maintenance of incandescent mantles. (i) Made up as follows: Meters, £4342 11s.; stoves, £14,995 7s.; prepayment meters and fittings, £20,597 13s. 10d.; and maintenance of incandescent mantles, £1113 8s. 1d.

TABLE *showing the Capital, Income, Expenditure, and Profit per* 1000 *Cubic Feet of Gas Sold in* 1909.

—	Gaslight and Coke.	South Metropolitan.	Commercial.	All the Companies.
	s. d.	s. d.	s. d.	s. d.
Capital and borrowed money (including premium capital)	24 4·30	13 3·35	16 5·88	20 0·84
Income—viz.:				
Sale of gas by meter	2 6·93	2 1·30	..	..
Public lighting and under contracts	1·52	0·65	..	..
Total gas-rental	2 8·45	2 1·95	2 5·57	2 6·08
Rental of meters	0·61	1·46	2·39	1·04
Rental of stoves, fittings, &c.	2·51	2·63	1·46	2·46
Residual products—				
Coke and breeze	5·46	5·79	4·31	5·47
Tar and tar products	0·94	1·25	1·08	1·05
Ammoniacal liquor and sulphate of ammonia	1·83	2·14	1·43	1·90
Miscellaneous, including old materials	0·21	0·22	0·06	0·20
Total income from all sources	3 8·01	3 3·44	3 4·30	3 6·20
Expenditure—viz.:				
Coal, including carriage and dues	11·43	1 1·41	1 1·97	1 1·26
Oil, do.	1·65	..		
Coke and breeze used in making carburetted water gas	0·70	..	..	0·41
Salaries of engineers and officers at works	0·32	0·53	0·37	0·39
Wages—manufacture	1·90	1·90	2·13	1·91
Purification	0·25	0·37	0·20	0·29
Wear and tear—manufacture	3·98	4·24	4·33	4·09
Salaries and wages—distribution	1·00	0·74	0·67	0·89
Repair and maintenance of mains and services	1·15	1·06	1·00	1·11
Repair and renewal of meters, stoves, &c.	3·09	3·50	3·07	3·23
Lighting and repairing public lamps	0·43	0·10	0·36	0·32
Rents, rates, and taxes	3·16	1·75	1·91	2·60
Salaries—management	0·19	0·14	0·19	0·17
Collectors' salaries and commission	0·48	0·60	0·68	0·53
Stationery, printing, and general charges	0·30	0·46	0·38	0·36
Directors and auditors	0·07	0·11	0·20	0·10
Co-partnership and profit-sharing schemes	0·26	0·77	0·42	0·44
Annuities to officers and workmen	0·58	0·29	0·18	0·45
Law and parliamentary charges	0·06	0·07	0·04	0·06
Bad debts and extraordinary expenses	0·37	0·15	0·14	0·28
Total expenditure on revenue account	2 7·37	2 6·19	2 6·24	2 6·89
Gross profit	1 0·64	9·25	10·06	11·31

NOTES FROM WESTMINSTER.

THERE is not much to record concerning work in the Committee-rooms last week. There was nothing doing on Monday; and on Tuesday the East Grinstead Gas and Water Bill was under consideration. Only a small part of the Bill refers to gas; the bulk of it having reference to water supply. One of the objects of the measure is to legalize the taking of water from land purchased by agreement. In addition to this there have been pipe-laying difficulties; and modification of the conditions as to the use of certain pipes, was required. A new pumping-station also forms part of the Company's scheme. There were a few private opponents, but the points of difference were not of any magnitude; and they were soon composed—the preamble of the Bill being declared proved. This closed the business in the Committee-rooms, until after the brief Easter recess.

The only other piece of news is that Lord Joicey has retired from the Committee to consider the Standard Burner Bills; and in his stead Lord Ritchie of Dundee has been selected.

CARBONIC ACID AND THE VITIATION OF THE ATMOSPHERE.

THE question of the vitiation of the atmosphere by gas-burners and human beings has received a little discussion in the articles of the Engineering Correspondent of the "Daily Telegraph." This writer, we feel, would not wittingly do an injustice to gas lighting; and he is always open to suggestion and, if necessary, correction. Just recently he was dealing with the question of lighting in places off the track of the town-gas main, and in doing so made reference to acetylene. In respect of this gas, he said that, as with coal gas, oppressive products are only given off when the gas is not thoroughly consumed. This is rather more difficult to obtain in the case of acetylene than with coal gas; the former requiring a larger quantity of air per cubic foot for its complete combustion. Only well and scientifically-constructed burners by reliable makers should be employed. Then we come to a point where the writer went astray: "From a hygienic point of view, it is to be noted that whereas a coal-gas burner consuming 5 cubic feet per hour vitiates the atmosphere as much as 18 adults, a similar acetylene burner only produces a vitiation equivalent to three persons. At the same time it consumes less oxygen per candle power than any other form of gas, and as a consequence gives off less carbon dioxide."

In a subsequent issue, this same "Engineering Correspondent" acknowledges an interesting correcting letter from Mr. Douglas Helps, of Reading, and admitted that his correspondent had, in his communication, achieved his object. In the course of his letter, Mr. Helps considered the misstatement—that a coal-gas burner consuming 5 cubic feet of gas per hour vitiates the atmosphere as much as eighteen adults, and that a similar acetylene burner only produces a vitiation equivalent to three persons*—to be a misprint. The statement, he points out, does not agree with that made above, where it is stated that acetylene requires a larger quantity of air per cubic foot for its combustion, because, if acetylene requires more air for its combustion, it must of necessity vitiate the atmosphere to a larger extent. But the statement that a coal-gas burner consuming 5 cubic feet per hour vitiates the atmosphere as much as eighteen adult persons, is obviously incorrect. The combustion of 1 cubic foot of ordinary coal gas produces from 0·52 to 0·54 cubic foot of carbonic acid, and an average individual exhales 0·6 cubic foot of carbonic acid per hour; so that the combustion of 5 cubic feet of coal gas would produce about as much carbonic acid as 4·4 persons—not 18, as stated in the article.

As this matter is so frequently referred to by competitors of the gas industry, it will not be out of place to remind readers of the following statements of authorities.

Professor Frank Clowes, Chief Chemist to the London County Council, pointed out, in a paper he read before the Society of Chemical Industry at Nottingham: "It is not so much the carbonic acid produced by the combustion of gas or by the respiration of individuals that is injurious as that the carbon dioxide present may be considered to imply *an increase of a far more pernicious organic matter excreted from the surface of the skin of the human body*."

Dr. Whitelegge, writing in "Public Hygiene," remarks: "Where carbonic acid gas is present in excess, it is important merely *as an index of the amount of injurious organic impurity contributed by human exhalations*."

The "Lancet" has stated: "Any carbon dioxide resulting from the combustion of coal gas is quite insignificant compared with that exhalded by the human individual. Of the two, the human exhalation is much the more prejudicial to health."

Professor Carlton Lambert, M.A., writing in the "Hospital," says: "In the old days of gas lighting, air pollution was in ill-ventilated rooms a more serious matter; but now that we get *the same light as formerly by burning only from one-sixth to one-tenth the amount* of gas, this objection to gas lighting has practically vanished."

Professor Vivian B. Lewes and many other authorities have made similar statements to the above.

To the foregoing may be added the fact that some time ago the St. Pancras Borough Council published a statement in a pamphlet entitled "Electricity: Useful Hints," as follows: "One ordinary gas-burner consumes the same amount of vital oxygen as five people. Putting it in another way, an ordinary gas-flame will render poisonous the atmosphere in a room 12 ft. by 14 ft. by 11 ft. in six minutes." The Gaslight and Coke Company sent a communication to the Council informing them that, unless this statement was withdrawn, they would have to consider the taking of further steps in the matter, with the result that the Council withdrew the pamphlet.

* A low-pressure incandescent burner consuming only 1½ cubic feet of gas would give a light of from 20 to 30 candles, and would not vitiate so much air as one adult.

MUNICIPAL TRADING IN THE METROPOLIS.

AT the time of its issue recently, brief mention was made of Part IV. of the returns in regard to municipal trading in the United Kingdom which have long been under process of compilation and publication at the instance of Mr. L. G. Chiozza Money, the late Member for North Paddington. A few figures have been at different times given from the preceding volumes; and it may be as well to continue the process now by setting forth some points from Part IV., which consists of particulars furnished by the London County Council, the Corporation of the City of London, and the Council of each Metropolitan Borough. The objects aimed at in the collection of the statistics of which this series of Blue-Books is composed is to indicate the nature and extent and, for each of the last four years for which figures are available, the financial results of reproductive municipal undertakings, including for each undertaking separately "a short description thereof, date and terms of original acquisition or establishment or subsequent extension, how managed, capital employed and how obtained, value of the undertaking, capital paid off and outstanding, loan charges, provision for depreciation, gross income and expenditure, net profit or loss, how profit is allocated or loss met, amount of relief or burden to rates, number and salaries of the chief paid officials, number of work-people, rate of wages paid in chief classes of labour, and prices charged for products or services supplied or rendered." In the returns, the places embraced are the municipal boroughs in England and Wales which at the date of the Census of 1901 had a population of upwards of 90,000—with the addition of two (Stockton-on-Tees and Blackpool) which have a smaller population. When noticing Part I. in the "JOURNAL" for June 22 last, some details were given with regard to the form in which the information was asked for and has been supplied.

In the present volume particulars are given (in addition to the London County Council and the City Corporation) with regard to twenty-seven Metropolitan Borough Councils; the single exception being Finsbury, which did not carry on, during the period to which the return relates, any undertaking deemed to be within the terms of the resolution of the House of Commons. With regard to these various authorities, the number of reproductive undertakings which fall to be included are respectively: London County Council, three; City Corporation, two; Battersea, four; Bermondsey, three; Bethnal Green, two; Camberwell, three; Chelsea, two; Deptford, three; Fulham, two; Greenwich, one; Hackney, two; Hammersmith, four; Hampstead, four; Holborn, one; Islington, three; Kensington, two; Lambeth, two; Lewisham, one; Paddington, one; Poplar, two; St. Marylebone, four; St. Pancras, four; Shoreditch, three; Southwark, two; Stepney, four; Stoke Newington, one; Wandsworth, one; Westminster, two; Woolwich, five. Gas supply, of course, does not figure at all in the present batch of statistics; while the water supply of London is in the hands of a separate authority. There are, however, in connection with the Metropolitan Councils named, no less than sixteen electricity undertakings. The only case of tramways, is that of the London County Council, who were also, at the time of the return, the proud possessors of a fleet of river steamboats, which have since found other owners, under circumstances that should long prove a thorn in the side of perfervid disciples of indiscriminate municipal trading. Of the other undertakings in the hands of the authorities, sixteen are working-class dwellings, and twenty-six are baths and washhouses. The remainder consist of eight cemeteries, three markets, and two milk depôts.

During the four years included in the return—1902-3, 1903-4, 1904-5, and 1905-6—some of the undertakings were successful in relieving the rates; while a great many more were not. The London County Council tramways, for instance, in the first year named provided £20,000 for this purpose; but in the three following years there was no repetition of this achievement. In the four years, the working-class dwellings of the same authority benefited the rates to the extent of nearly £18,000. The artizans' dwellings of the City Corporation handed over nothing to the rates; while as to the markets under the control of the Corporation, they do not regard these as undertakings coming within the terms of the resolution of the House of Commons.

So far as relieving the rates was concerned, the Battersea electric lighting undertaking might just as well not have been in existence during the period under review—in fact, better, for the

rates had on two occasions to contribute sums for the relief of the undertaking. The Bermondsey electricity undertaking was once aided by the rates; a favour which it did not reciprocate during the four years. There has in each of the four years been a deficiency on the Fulham electricity concern which the ratepayers have had to meet. The record at Hackney has been a better one; for there on one occasion a sum was handed over to the rates. A note in reference to this states that the Council had, previous to the year ended March 31, 1903, paid out of the general rate fund sums amounting to £4703, being expenditure in excess of income during the years ended March 31, 1901 and 1902. The sum of £1329 was transferred in 1904-5 in aid of general rates by way of recoupment. In the last year of the returns, Hammersmith ratepayers received £3000 from the electrical works; while those of Hampstead benefited by £2000 in each of two years. In respect of Islington, no figures appear in either of the columns; and a like remark applies to Poplar and St. Marylebone. There were at St. Pancras two sums handed over to the rates—£7220 and £3000 respectively. At Shoreditch, the reserve fund was once called upon for £2241; and nothing was given to the rates from the electricity works. The Southwark works twice received assistance from the rates; a favour which was not returned. In the case of Stepney and Stoke Newington, no figures appear in either column. At Woolwich, in all the four years a deficiency had to be made good from the rates; the total sum amounting to no less than about £20,000. The remark is made that "there has, as yet, not been any surplus income from the undertaking."

With regard to the other concerns of which particulars are given, baths and washhouses have in every instance involved a practically continuous call on the rates. The other losses have been: Dwellings—Battersea, Chelsea, Marylebone, Shoreditch, and Woolwich. Milk depôt—Battersea. Cemeteries—Hampstead, Marylebone, and Woolwich. In some cases, however, cemeteries have assisted the rates; the following being the extent: Deptford, £800; Hammersmith, £350; and St. Pancras, £1500. Markets, also, at Woolwich have benefited ratepayers in the four years to the extent of £2600.

It will be seen that in the case of the Metropolis, with the exception of electricity, the "reproductive undertakings" are mainly of such a character that they have not been entered upon solely, or even chiefly, from a profitable trading point of view. Baths and artizans' dwellings, for instance, doubtless owe their origin to other considerations—as well as milk depôts and cemeteries; and it would be unfair to judge them by the profitable (or otherwise) nature of the results. To the electricity undertakings, however, this remark does not apply. They must be regarded as trading concerns pure and simple; and looked at from this point of view, their record is not a brilliant one. Of course, in this notice no attempt has been made to deal fully with the 230 pages of which the Blue-Book is composed. We have merely, as before, taken the profit and deficiency figures in relation to the rates, as being the standard by which the policy of municipal trading is usually judged. It is under no circumstances a conclusive test of the soundness or otherwise of the policy; and in the case of the Metropolis, the character of the majority of the undertakings concerned renders it even less so than usual.

CONVENIENCE OF GAS LIGHTING.

A RECENT number of the "Transactions" of the American Illuminating Engineering Society had an article on this subject by Mr. T. J. Litle, jun., from which the following are extracts.

The use of illuminating gas in the lighting of the modern American home is a most interesting topic in which we are all directly concerned, even though we may be identified with the electrical interest. The reason that gas is used so generally for artificial illumination is due to the fact of the great comparative economy effected. The disadvantages attributed to gas illumination are certainly offset by the weak features of the electric system; and many of the shortcomings of both systems exist principally in the fertile brains of our rival advertising managers. For instance, a gas critic says gas lighting burners produce excessive heat. The reply comes back like a flash—only in the summer time when the lighting hours are very short; at other seasons, heat is desirable. And then he will probably add: All types of illuminants attract mosquitoes and other terrible insects. The gas light will destroy these pests, much to the comfort of the householder, &c. Again, the gas critic may add: Consider the vitiation of the atmosphere. He is then met with positive proof that gas-burners actually stimulate ventilation, as is pretty well demonstrated in any chemical laboratory. The incandescent gas units which are now available for house lighting are as follows: 3½-inch upright mantle, 1⅛ inch in diameter; 2½-inch, do. do.; and the miniature upright mantle and chimney combination, which mantle is 2⅛ inches long and ¾ inch in diameter. Combination carriers are supplied, so that small upright mantles may be used on the large-sized burners; small burners are also supplied, particularly for use with the small mantle. The standard inverted mantle in general use at the present time is 1 inches diameter and about 1⅝ inches deep; but smaller mantles are now being introduced. The latest fixtures are unquestionably great improvements over the old and stereotyped designs.

The catalytic lighters have long been used for igniting gas-burners. In some cases the self-lighting material was placed directly on the mantle; in others, a pilot-light was first lighted from this material and the light afterwards lit the burner. Yet another modification is to use a small electric current to bring the catalytic material up to the active point, and then allow the gas to do the rest. The latter is by far the most promising form of electric ignition. The pyrophoric lighter invented by Dr. Auer von Welsbach presents an extremely interesting field for development; but I am not prepared at this time to state that a burner with this scheme of lighting is commercially successful. Electric hot wire lighters do not light gas by the simple process of heating wire to a temperature approximating the kindling-point of the gas, but to a much lower temperature. The gas is always lighted by the catalytic action bringing up to a much higher temperature the already warm wire. A very popular form of hot-wire lighting is the so-called electric torch. In this case the electric battery is concealed in the handle of the torch; the wire to be heated being placed in a cage-like structure in the end.

The use of matches in lighting gas-burners is unnecessary. There are a number of ways in which gas-lamps may be made self-lighting, both at the burner and from a distance; the most simple and popular scheme being the gas pilot ignition. This system, in its simplest form, consists of a cock controlling the supply of gas to the burner as well as feeding a very small supply of gas to the pilot-flame, which is situated close to the side of the mantle. This tiny spark of flame consumes 1-12th of a cubic foot of gas per hour; and apart from being useful in igniting the gas, it produces just enough illumination to guide one to the burner in a dark room. This is a most important feature when considering means to control any type of illuminant, gas or electricity.

Inventors have been busy for years trying to produce some self-luminous indicator in the form of either a pendant ball at the burner or socket, or a luminous wall-plate at the switch. But unless these devices are allowed to absorb considerable light during the day, they are worthless. So that with the pilot-flame we have at once something which is effective in ignition as well as a guide in locating the device in a dark room.

Another system of gas ignition is by means of the pneumatic valve operated by a small pump from a distance; the gas being turned on and off when the pump is pushed in or pulled out by successive pressure and partial vacuum, and the gas being ignited by a small pilot-flame. The tubing is known in the trade as "hollow wire," on account of its small diameter.

The third class of lighting by means of a pilot is in connection with an electric cock. The current is here used simply to turn on and off the gas-cock; the pilot-flame being used for ignition. The fourth device is the mechanical distance lighter, in which a pull-wire is connected with the cock at the burners, and runs in any desired direction or distance. A spring is used to return the cock to its "off" position upon releasing the tension on the wire. The fifth device is where double gas lines are run—one supplying gas to the pilot, the other controlled by a cock at a distance from the burner. Of course, there are various modifications and combinations of the above systems.

The electric spark system of gas lighting has been pretty well developed. In this case the gas may be lighted at the burner by pulling a chain which opens the gas-cock and at the same time operates an arm carrying a wiping-spark contact for igniting the gas. The gas may also be lighted from a distance by means of the automatic electric burner, in which case magnets turn the gas-valve on and off, and an automatic interrupter is used to produce the desired spark for ignition.

Personally, I believe that the most promising form of ignition will be by means of the pyrophoric material before mentioned, because it is not necessary to run special wiring, as is the case with electric ignition. Moreover, there is no deterioration of this material when not in use. It has the further possibility of advantage in the fact that the device is self-contained, and can be made part of the lighting device. It must be remembered that a very large portion of American gas consumers rent their homes; and if we are to introduce a successful scheme of gas ignition, it must not be necessary for them to wire the building, for a tenant will never wire someone else's house.

I have merely attempted to show that gas lighting can be easily engineered for residence work. It is extremely safe and convenient, and the quality of the light, according to the most eminent physicists, is beyond reproach.

Award in the Ammanford Gas Arbitration.—The award of Mr. Charles Carpenter in the arbitration proceedings in connection with the purchase by the Ammanford Gas Company of the undertaking of the Amman Valley Gaslight and Coke Company (see *ante*, p. 672) has been given. The amount of the claim was £5365; and the Arbitrator has awarded £4195.

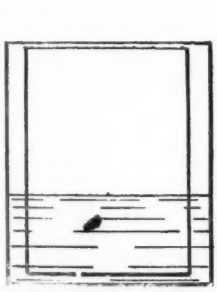
The Late Sir Frederick Thorpe Mappin.—There was an immense gathering, representative of all grades of Sheffield society, at the funeral of Sir Frederick Thorpe Mappin, Bart., which took place at Ecclesall Churchyard last Wednesday. Members of the Corporation assembled at the Town Hall, and drove to Thornbury, where they joined the principal mourners in the procession to the church. Among those present were Mr. J. D. Webster, a Director, and Mr. J. W. Morrison, the Engineer, of the Sheffield United Gas Company; the Chairman, Mr. Wilson Mappin, being, of course, one of the chief mourners. The service was conducted by the Bishop of Sheffield (Dr. Quirk).

AUTOMATIC LIGHTING AND EXTINGUISHING OF GAS-LAMPS.

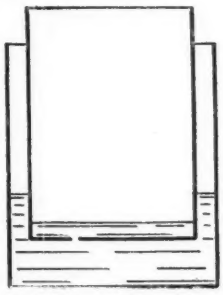
The A. E. Broadberry Apparatus.

It will doubtless be remembered that in the "Journal" for the 8th inst. it was mentioned that Dr. Rostin, whose name has been intimately identified with the development of a system of lighting and extinguishing public lamps, had severed his connection with the firm of A. Landsberger, with the intention of devoting himself independently to the manufacture of scientific apparatus for the gas industry, and at the same time acting as Consulting Engineer to Telephos Limited, in conjunction with the gas lighting and extinguishing apparatus invented by Mr. A. E. Broadberry, the Engineer of the Tottenham and Edmonton Gas Company. Some further details of this apparatus were then promised; and these we are now in a position to supply.

Though it is hardly necessary to point out the advantages of automatically lighting and extinguishing gas-lamps, they may be briefly summarized by way of introduction to the description of the apparatus with which this article is specially concerned. In the first place, there is no waste of gas, and a longer life for the mantle is ensured—two features which necessarily result in saving of money. It is essential that the system adopted should be one which is controllable from a centre; and this is the special feature of the one in which the pressure is employed. Up till now, however, it has been necessary to determine beforehand the amount of pressure to be applied; and, as this cannot always be guaranteed throughout a district, a system was required in which such pre-determination could be dispensed with. It is claimed for the Broadberry apparatus that it meets this requirement, as it adjusts itself to any conditions, and differentiates between intentional and accidental variations or rises of pressure. Briefly, it works by pressure, but it is independent of its variations. These, when involuntary, take place comparatively slowly, or sometimes quickly to the extent of 1-10th or 2-10ths; but an intentional rise in pressure can always, and under any circumstances, be given comparatively quickly. Even where the governors are loaded with weights, it can be easily arranged for the ordinary rises to be given slowly; but those for working the Broadberry apparatus can be given quickly. Thus it distinguishes between slow and quick rises.



Liquid Poured in Slowly.

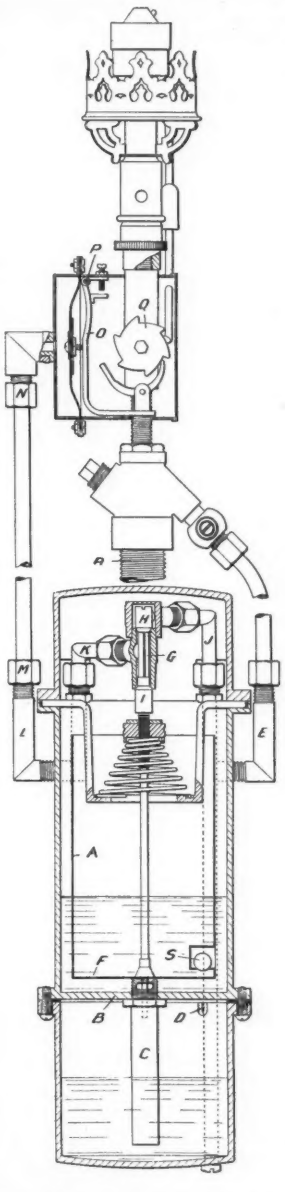


Liquid Poured in Quickly.

The reader will probably be curious to learn how this is done. A simple experiment will explain the principle. Take two vessels of different size, as in the accompanying illustration, pierce a pin-hole in the bottom of the smaller vessel, and place this inside the larger one. If liquid is poured between the two vessels sufficiently slowly, it will percolate through the small hole into the smaller vessel, and the latter will remain stationary. Should, however, the liquid be poured in quickly, the smaller vessel will rise, and after a time the levels of liquid will equalize. The smaller vessel will then return to its former position, and the process may be repeated. This, briefly, is the principle involved in the Broadberry apparatus; the upward movement of the small vessel being utilized to open a small gas-valve leading to an operating chamber, and the equalizing movement to close the valve and open the outlet from it. What is required for the Broadberry system, therefore, is not a predetermined height of pressure, but a comparatively quick—that is, quick in the sense of loading a governor by weights—rise of (say) 5-10ths. The construction of the apparatus is designed with a view to giving the maximum efficiency to the principle involved, and at the same time to be, as far as possible, unaffected by long exposure in the streets.

The accompanying diagram is a sketch of the apparatus, showing all the working parts; and by referring to it the following description will be readily understood. The bottom portion of the diagram represents a section of the valve-box, which is made of non-corrosive metal, to ensure long life to the apparatus. This case is divided into two chambers; the lower one being filled with a non-freezing and non-evaporating mixture of glycerine and water, and the upper one being utilized to contain a spring-balanced metal float A made also of non-corrosive metal. These two chambers are separated by a horizontal metal partition B, through which a glycerine passage is made by a brass pipe C extending downwards nearly to the bottom of the lower chamber. In the wall of the valve-box is drilled a longitudinal hole, having an outlet to the bottom chamber at the point D. Into this hole is led an elbow E, connected to the stand-pipe of the lamp.

The pressure of gas issuing from D will cause the level of the glycerine in the bottom chamber to fall; the surplus liquid being forced through the tube C into the top chamber until the difference in levels coincides with the actual pressure prevailing. The float A is provided on its lower surface with a hole F, gauged to allow the glycerine to flow at a given rate into the interior of the float. Obviously, then, should the pressure rise slowly, the levels of the glycerine inside and outside the float will rise simultaneously, and no movement of the latter will follow. Should, however, a sharp rise of pressure take place, as would occur if intentional pressure were put on at the works by weights, the level of the glycerine outside the float would rise more rapidly than the level inside, and the float will be lifted.



The float is guided by a brass rod, which on the upward lift comes into contact with the valve G. This valve consists of two coned surfaces H and I, which, though quite free in movement, are at the same time absolutely gas-tight, and when moved allow a free passage of gas at full pressure from the elbow E to be transmitted through J to K, thence by way of the elbow L to the "operator;" a connection for this purpose being made between points M and N. The "operator," into which the power for turning the gas on or off is transmitted, and which is shown in the upper portion of the diagram, is fixed directly under the burner. It consists of a vertical diaphragm stretched over a metal box. A curved lever O is suspended from a pivot P above, and on the diaphragm moving outwards in a horizontal direction it turns, by means of a ratchet-wheel Q, the cock of the main burner supply to an open or closed port as desired.

The cock is worthy of some notice, as it overcomes many of the objections which have been raised to the devices generally used in automatic lighting appliances. It consists of a cylindrical plug turning in a correspondingly shaped barrel, and held in position by a special clip—an extremely ingenious and simple device, which renders the cock easy of access, is free from nuts or screws and greatly simplifies cleaning, as the plug of the cock can be removed by a simple pressure of the finger. Another thing worthy of note is that no working parts of the apparatus are inside the gas flow, and consequently there is lessened risk of any stoppages through naphthalene or other deposits; further, that the gas supply to the burner goes straight from the stand-pipe R and not through the apparatus.

As explained above, the float having risen and lifted the valve, and the gas having passed through to the "operator," which in its turn opens the gas-way to the burner, the apparatus has performed its work of lighting the lamp. This operation completed, the glycerine percolating through the small hole gradually reaches the same level inside the float as outside, thus rendering it non-buoyant, and by so doing allowing the float to drop. This movement closes the inlet H of the valve G, and at the same time opens the outlet. The diaphragm then recedes, the curved lever engages in the next step of the ratchet, and the apparatus is ready for the subsequent operation of extinguishing, when all that is required is another sharp rise of a few tenths.

It has further been found necessary to make provision to cope

with districts where the pressure falls rapidly before lighting-up time, and when rising attains a level not higher than previously recorded. This has been accomplished by the introduction of a special valve S, so constructed as to allow the glycerine to escape out of the float as quickly as the level of the glycerine round the float falls; thus bringing the apparatus into a position to respond at any time to a given increase. As the weight of the float is counterbalanced by the spring, the more the latter is loosened the less sensitive the apparatus becomes. By increasing the tension of the spring, more weight of the float is taken up, and the sensitiveness of the apparatus is increased.

Thus the Broadberry apparatus can be adapted to work by certain quick rises and to remain unaffected by smaller sharp rises. It is easily adapted to any existing make of lantern and to any known type of burner—upright, inverted, self-intensifying, or high-pressure. The bye-pass is arranged to extinguish after the mantle is illuminated, and re-ignites on the gas being cut off from the burner. Where, desired the apparatus can be arranged to work without a pilot-light.

It only remains to say that the apparatus is the embodiment of years of practical experience in automatic lighting.

FUEL AND REFRACTORY MATERIALS.*

THE volume under review is a second edition of this useful work. Little alteration has been made in the general arrangement, though considerable additions have been made in several directions, especially in connection with coke-ovens, gas-producers, and pyrometry. In his preface, the author expresses his regret that he has found it necessary to use British weights and measures in preference to the metric system. The latter has not yet progressed sufficiently to justify this course being taken. The author is not alone in this expression of opinion.

The work is divided into fifteen chapters, dealing fairly fully, though not completely, with "Fuels" in general use. From the title, it would be thought that "Refractory Materials" would be more or less thoroughly dealt with; but this is by no means the case, as, out of a total of 355 pages, only some 28 touch this somewhat (in the gas industry) debatable question, and the details given are, for the most part, of little interest to gas engineers. In fact, a perusal by a gas engineer of the book under review gives the impression that it has been written by a metallurgical engineer for metallurgists and other workers in closely allied industries. For instance, in a chapter on "Gaseous Fuel," the subject of coal gas—an important fuel in general use—is dismissed with a badly informed, absurdly insufficient, and inaccurate description occupying a few lines over one page. To commence with, we are informed—and by a book published in 1909—that coal gas is used to "a small extent for domestic heating." Is the author aware that in London alone the gas heating-stoves in use number approximately one million? He has only to compare this quantity with the population of London to convince himself of the absurdity of his statement.

He passes on to remark that "it is too expensive for furnace use, but is used with success in many minor operations where only a small quantity is used, and therefore where its cost is only of secondary importance." Perhaps Mr. Sexton does not know that in Sheffield coal gas is being sold for 1s. per 1000 cubic feet, and is being used on a very extensive scale for furnace and other industrial uses in this and other large towns? We are next informed that gas for lighting purposes is carefully purified from carbon dioxide and sulphur compounds. For the information of the author this was correct to a certain extent some years ago, when lime was in general use; but now, and for some years past, oxide of iron has superseded it in all the principal gas-works, with the result that gas is not purified from either carbon dioxide or sulphur compounds—by which is meant carbon bisulphide and sulphur compounds other than sulphuretted hydrogen—but only from sulphuretted hydrogen.

The author, even in the matter of cost of gas, gives a very false impression of the general charges in this country. He states that it varies from 2s. 6d. to 8s. per 1000 cubic feet. The latter price may be charged in some out-of-the-way place unknown to the writer; but a much lower figure than the first-named—viz., 2s. 6d.—is being charged by scores of gas companies and corporations all over the country, especially in the northern parts of England in close proximity to the coalfields. Even in London the Wandsworth and Putney Gas Company charge only 1s. 10d. per 1000 cubic feet to ordinary consumers and 1s. 6d. or 1s. 7d. to power users. It may also be news to the author, as his knowledge of gas matters appears to be somewhat limited, that a large number of gas undertakings allow special discounts up to 20 per cent. or 25 per cent. for gas used for power purposes; thereby bring down the cost of gas to about 1s. 6d. per 1000 cubic feet, at which rate other fuels must indeed be cheap to compete with coal gas on advantageous terms. On reading this paragraph, one is given the impression that, had it been written 30 or 40 years ago, it would have fairly represented the state of the gas industry at the time. A typical analysis of coal gas is given, as well as a method of calculating the calorific value of a gas from its composition. The author's method is to ascertain the weight of each constituent and calculate the calorific power from the known heating value of a given weight of gas. Mr. Sexton gives the following figures as an example:

Hydrogen . . .	48	litres =	4·291 grs.	× 34,180 =	146,666
Carbon monoxide .	8	,, =	9·947 ,,	× 2,427 =	24,141
Methane	36	,, =	25·804 ,,	× 13,062 =	103,815
Ethylene	3·8	,, =	4·762 ,,	× 11,857 =	56,463
	95·8				
Non-combustible .	4·2				
	100·0		50·082 grs.		331,085

So that 100 litres will evolve 331,085 units, and its calorific power will be $\frac{331,085}{50,082} = 6411$ (C. units), or 11,540 B.Th.U. As 1000 cubic feet weigh 31 lbs., 1000 cubic feet would evolve on combustion 347,740 B.Th.U."

Unfortunately, Mr. Sexton has made an arithmetical error which results in the calculated calorific power being nearly halved. It will be noticed that, in multiplying 25·804 by 13,062, the author gives the result as 103,815, whereas it should be 337,051. This accounts for the calorific power being given as 347·740 B.Th.U. per cubic foot instead of 628·742. The fact that this result was allowed to pass uncorrected is another instance of the author's lack of knowledge on the subject of coal gas. It may here be suggested that an easier method of calculating the heating power of a gas from its composition is to multiply the percentages (by volume) of each constituent by the known heating value per cubic foot. This is the method employed by all gas authorities.

So much space has already been taken up in dealing with a page of erroneous matter on coal gas that it will be advisable to pass on to some other subject. The author commences by describing the principles of "Combustion," followed by a chapter on the "Heating Power of Fuels." The various solid fuels are next dealt with. The subject is divided into natural fuels and prepared fuels; considerable attention being given to the subject of coke making in ovens. All the principal coke-ovens are described in this chapter. Next in order are treated the subjects of "Coal Washing" and "Liquid Fuels." Both chapters are short, but interesting.

Natural gas comes in for some consideration in a chapter on "Gaseous Fuel." It is impossible to observe the ideal nature of the constituents in this gas without wishing that it could divulge the secret of its preparation. A large variety of gas-producers are described with excellent illustrations; and much interesting detail is here given, including an abstract from Mr. T. Duxbury's Presidential Address to the Manchester District Institution of Gas Engineers, in which he compares the relative cost of town gas and suction gas for power purposes. Various methods for the "recovery of bye-products" are described, including the Alexander and M'Cosh, Dempster, and Gillespie processes for cooling and washing the gas. In the descriptions of the methods adopted in other industries for dealing with gas, it is frequently possible to learn much which may be of service in a gas-works; and in this regard the book under review is no exception.

The author deals in some detail with the subject of "Furnaces for Metallurgical Purposes." The same may be said of "Pyrometry;" no less than twenty pyrometers being described. Three short chapters on "Calorimetry," in which a Junkers calorimeter is described, the "Utilization of Fuel," and "Testing Fuels," conclude what is, taken as a whole, a very interesting and useful book. But for the author's inexplicable disregard of the many and important uses of coal gas for fuel purposes the work might have some claims to be considered complete. The variety and amount of information, the clearness of exposition, the excellence of the illustrations, and the modest price of the book (5s.) are all factors which should commend the work as a useful addition to the reference library of the technical reader.

* "Fuel and Refractory Materials," by A. Humboldt Sexton, F.I.C., F.C.S., Emeritus Professor of Metallurgy in the Glasgow and West of Scotland Technical College, &c. London: Blackie and Son, Limited; 1909. [Price 5s.]

The Hamburg Gasholder Disaster.—In an article on this subject which appeared in the "JOURNAL" for Dec. 21 last, the author (Mr. F. S. Cripps) promised a further article demonstrating the action of gasholder cups, and giving rules whereby it may be determined whether the cups will blow when uncupping, and, if they do so, the remedy for the defect. This article is now ready; but we regret it has had to be held over owing to the pressure on our space of other matter—particularly current news.

The Dessau Vertical Retort Installation of the Providence (R.I.) Gas Company.—In the "JOURNAL" for the 3rd of August last (p. 313), we reproduced from "Progressive Age" an article by Mr. F. J. Mayer, describing, with illustrations, an installation of vertical retorts on the Dessau system in course of erection at the new works of the Providence (R.I.) Gas Company at Sassafras Point. We learn from the last number of our contemporary that the Company have placed an order for an additional six benches of these retorts with the Didier-March Company, of New York, who are the designers and builders of the new plant which is approaching completion. A number of reproductions of photographs show the various stages of the work. Owing to the unstable character of the soil, timber piling had to be resorted to in preparing the foundations, in the construction of which concrete was exclusively employed.

MEETING THE GAS DEMANDS OF BROMLEY AND CRAYS.

Twin Generator Carburetted Water-Gas Plant—High-Pressure Plant and Mains to Supply the Crays District.

(*Concluded from p.* 798.)

The Oil Supply.

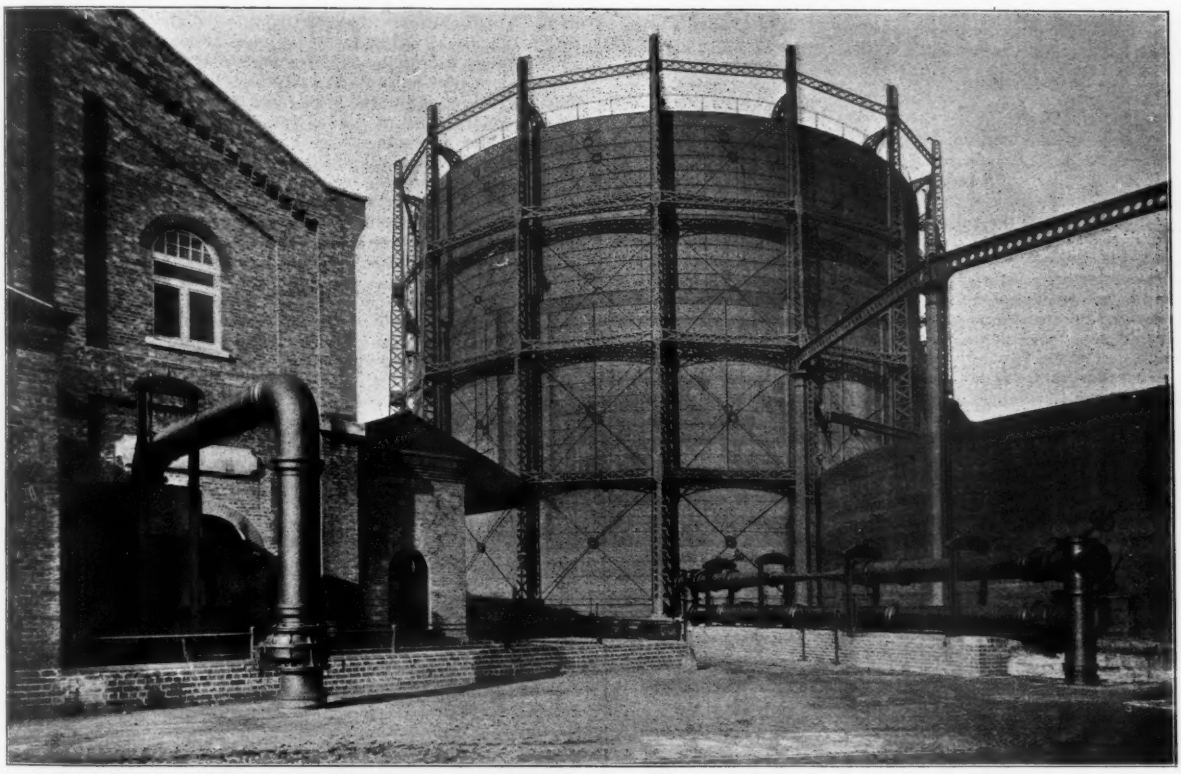
One thing in particular that struck us on this visit was the total absence of all pumping of oil, and the necessarily untidy and generally leaky and dirty conditions caused thereby. As a matter of fact, although there is considerable lifting and dealing with the oil used for carburetting, there is not a single pump in use for the purpose. The oil used comes into the works by motor tank-waggon or railway tank as desired; and the oil is then run by gravity therefrom into a closed tank capable of holding 3000 gallons. Immediately the motor or railway tanks have run their cargoes of oil into this tank, by a system of valves, &c., the inlet is closed, and air pressure is brought to play from an Ingersoll "Rand" compressor; and the oil is then forced up into the general storage tank, which holds about 120,000 gallons, from which it comes back by gravity into the gas plant as required. The system is wonderfully simple, and its cleanliness is most marked.

The Venturi Station Meter—A New Departure.

Concerning the Venturi station meter before mentioned, this is a somewhat peculiar piece of apparatus; and as its application to gas measurement is quite a new departure, some description of it may be interesting.

The apparatus erected at Bromley is on the trunk main immediately after the relief holder, and consists of a system of two lengths of pipes one above the other. In the upper length is inserted a taper or Venturi throated tube with its connections to the recorder. The lower row of pipes is simply the bye-pass for use in case of mishap, blockage, or failure in the Venturi tube. The registration device or recorder (which is the patent of Messrs. Hodgson and Kent) is situate some 230 feet away, in the water-gas blower-house, where it stands an example of marvellous ingenuity and perfect English workmanship.

The flow of gas is measured by the fall of pressure between the upstream and the throat of the "Venturi" tube, which is



The Venturi-Tube Meter (shown on the Right-Hand Side of the View).

placed in the upper gas-main before mentioned. The "Venturi" tube is the only part of the meter which comes in contact with the gas, which arrangement eliminates the possibility of the derangement of any mechanical part by tar, water, or naphthalene deposits from the gas itself. In cases where there are possibilities of the tube being fouled by these deposits, the difficulty is overcome by keeping the tube at a slightly higher temperature than that of the gas passing through, by means of a steam or hot-water jacket. The "Venturi" tube is also provided with an interchangeable throat—in an available position, and changeable at a moment's notice; allowing the throat of the one not in use to be examined, and cleaned if fouling is apparent.

The fall of pressure across the "Venturi" tube at full load is 3 inches of water-gauge, and is considerably less at the lower loads. The range over which this type of meter will register correctly is down to 1-28th part of the maximum flow. Below this flow, the meters do not register at all—the counter being cut off by an automatic device. It is possible that this limitation of range will prevent the meters being used in some of the smaller schemes where gas is only made intermittently. If a greater range of registration is required, two Venturi tubes (one large and one small) must be used. This would add to the expense, but would enable a range of 1:400 being obtained.

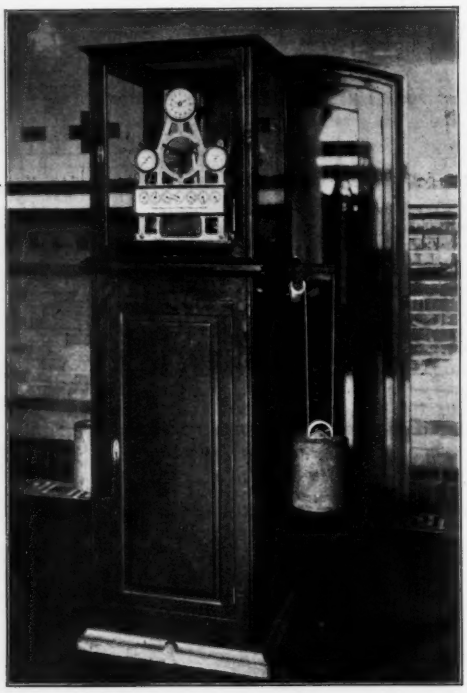
The meter also corrects automatically for variations in temperature and pressure of the gas; the counter reading giving the quantity which has passed reduced to standard temperature and pressure. In many cases, these corrections will not be necessary as the total correction so applied under extreme conditions is seldom more than 8 per cent.; a given change of temperature or pressure only causing (we are informed) half the error on a Venturi meter as on an ordinary station meter, owing to the fact that the former depends for its measurement upon the square roots of the pressure and temperature, instead of being proportional to these quantities, as is the case with the ordinary station meter.

The meter does not record continuously as in the case of the present station meters, but takes account of the rate of flow, the pressure, and the temperature at intervals of approximately one minute, and adds the result to the counter-reading. When the flow does not vary rapidly, there is no objection to this method of recording.

The recorder to which the Venturi head, the pressure, and the temperature are transmitted, may be placed at any reasonable distance from the gas-main. In the Bromley installation this distance is approximately 230 feet. This flexibility in the position of the recorder should frequently prove to be an advantage.

The recorder has dials which indicate—

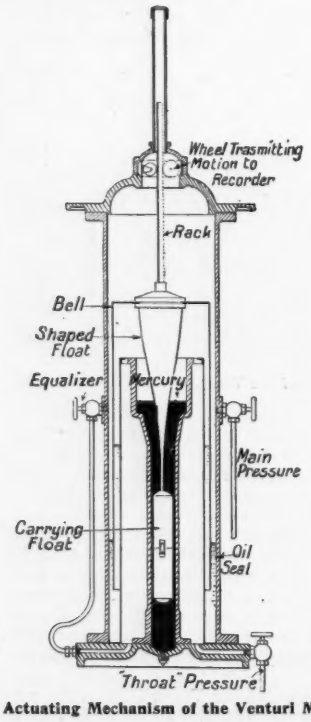
(1) The rate of flow, in cubic feet per hour.
(2) The absolute pressure of the gas in the main, in inches of mercury.
(3) The temperature of the gas in the main, in degrees Fahr.
(4) The total quantity of gas passed, reduced to standard temperature and pressure.
(5) The hour of the day.



The Venturi Recorder.

The mechanism of the recorder is securely protected in a dust-tight case; the recorder itself being (as previously mentioned) situated in the turbine-house.

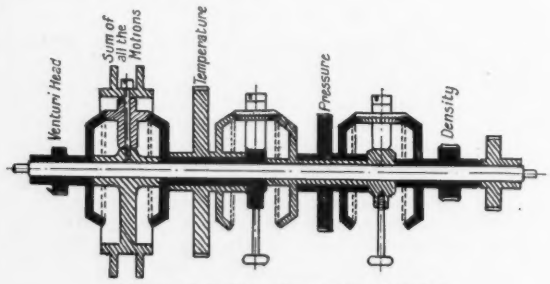
The meter does not correct for variations in the density of the gas, due to any changes in its quality caused by alteration in the process of manufacture, &c. It, however, can be immediately adjusted, by means of a small milled screw fixed to the recorder, to measure gas of any density provided the density of the gas is known. The density, of course, can easily be taken by a Lot's balance or an equivalent arrangement.



Bell and Float Actuating Mechanism of the Venturi Meter Recorder.

The methods adopted to measure the three variables—Venturi head, pressure, and temperature—are as follows: The Venturi head is measured by the movement of a light inverted bell immersed in an oil seal; the throat pressure acting on the inside of the bell, and the upstream pressure acting on the outside. The arrangement is identical with that of a gasholder, with the exception that the largest pressure acts on the outside, instead of on the inside, and causes the bell to sink instead of to rise. The weight of the bell is taken by a carrying float, which is always totally immersed in mercury.

The amount of movement of the bell for any given increase in the Venturi head is determined by a second float, which is specially shaped, is placed on the under side of the bell, and dips into the mercury. For any given increase in the flow, the bell descends until the increase in the difference of pressure is balanced by the increase of buoyancy of this specially shaped float. By these means, a movement proportional to the flow itself is obtained. This movement is transmitted to the mechanism outside the bell by means of a rack and wheel.

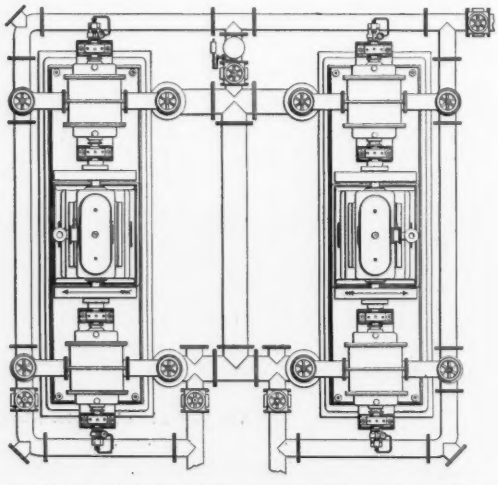


Differential Shaft on the Venturi Recorder.

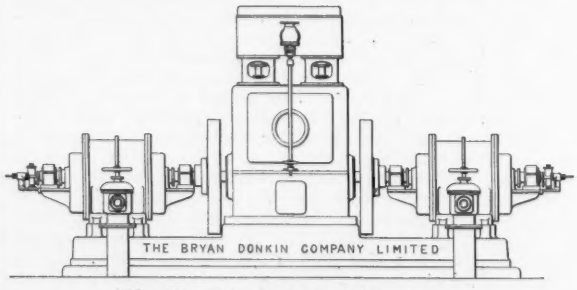
The pressure of the gas is measured by a battery of aneroids similar to those used in an ordinary aneroid recording barometer. This battery is placed in a chamber in connection with the gas-main. The movement is proportional to the absolute pressure of the gas (*i.e.*, to the difference of pressure between the vacuum inside the aneroids and the gas pressure acting outside them). The arrangement thus corrects the readings for variations of atmospheric pressure, and in the gas pressure itself.

The temperature is measured by means of a small steel cylinder placed in the gas-main, which contains liquid ammonia. The vapour pressure of this liquid is transmitted through a thin pipe to a pressure-gauge in the recorder; and since the vapour pressure of any liquid depends only on its temperature, we have here a very accurate and simple method of transmitting the temperature of the gas in the main to a distance.

The makers are Messrs. George Kent, Limited, of Luton, who (in conjunction with Messrs. Fraser and Chalmers, of Erith) have carried out most exhaustive tests and calibrating experiments, costing many thousands of pounds, as this system of meter is being extensively adopted for measuring compressed air supplied from central generating stations for the mines in South Africa.



Plan of the Engines and Compressors, showing the Connections.

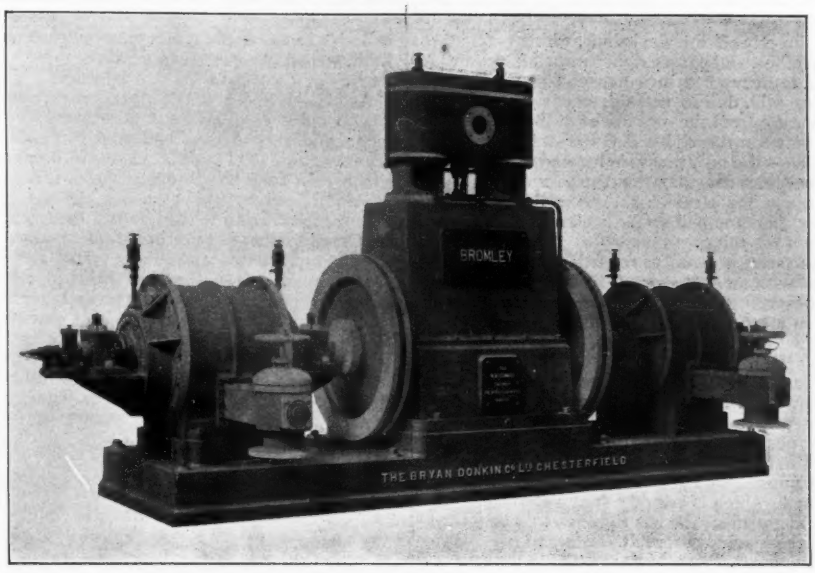


Elevation of the Engine and Compressors.

High-Pressure Plant for the Crays Supply.

As was said at the commencement of this article, the gas required in the Crays district is now delivered from the Bromley works by compressors through a high-pressure main.

The plant is so arranged that it can take gas from any one of the holders on the Bromley works, and so that the gas can be boosted from one holder to another—that is to say, the gas can be driven from a light holder which will not give sufficient district



The Engine and Compressors.

pressure into a heavier one. This is found very valuable in the work of distribution.

The compressors are situated in a specially constructed house, 30 feet by 30 feet, which, with its tiled walls and floor, is quite picturesquely designed. At one end a tablet is let into the wall, bearing the County of Kent coat of arms, the names of the Company's Directors and Engineer at this epochal time in the history of the concern, and the date. But these are merely the surroundings to the central features of the building; and they are features such as will delight the mechanical engineer to examine. They consist of two complete installations of two rotary compressors centrally and direct driven by vertical engines having double cylinders, 12 inches diameter by 10-inch stroke. The double cranks are arranged at right angles, so that a perfect torque is obtained, ensuring steady running; and the engines will start in any position without barring.

The engines and compressors are in each set mounted on a massive cast-iron bed-plate, and are thus self-contained. The engines are of the enclosed type, and absolutely fool-proof, as they have no moving reciprocating parts exposed. All bearings are continuously and positively lubricated by oil under pressure, and which oil the engine itself pumps through the bearings at a pressure of from 15 to 20 lbs. per square inch.

The crank-shafts and pins being hollow, the oil is forced through them to the crank and connecting-rod bearings, and to the eccentrics and every other bearing. The drippings and used oil after lubricating are collected in the engine-base, filtered, and again pumped through the engine-bearings.

The compressors are fine pieces of machinery, made by the Bryan Donkin Company, of Chesterfield and London, to the designs of Mr. H. M. Hodson, the patentee. They are of the rotary type, and are each capable of pumping 30,000 cubic feet of gas per hour against a pressure of 10 lbs. per square inch, at a speed of 110 revolutions per minute. In appearance they resemble the ordinary Beale exhauster; but the internal design is altogether a new departure. A double-ended slide forming one casting is directly rotated by a block of large dimensions, which forms part of the driving-shaft, and which passes through the machine from one end-plate to the other. This shaft is made of a special steel alloy. The cast-iron drum, which forms the driving member of an ordinary exhauster, is in this compressor itself rotated by the double slides forming the pistons of the machine. While, therefore, the simplicity of an ordinary exhauster is retained, the design is stronger, and much more suited for running against the heavier pressures that are involved in modern high-pressure gas transmission.

Interior of the Compressor House.

The drive is taken directly off the steel shaft, which is 6 inches diameter in these machines, and passes right through them, and is supported at each end in heavy bearings on each end plate. The cast-iron drum rotates idly, due to the movement of the slides; and as there is no pressure from the movement of the slides, and no driving pressure between the slides and the drum, the wear at this point is negligible—the only pressure between them being that attributable to the slides dragging the drum round. All the driving pressure occurs at the steel block, the working faces of which get forced lubrication pumped up the centre of the driving-shaft by an independent oil-pump.

The efficiency of the compressors as regards "slip" is much improved as compared with an ordinary exhauster. The special design permits of slides being used of very deep section, with consequent increase in strength, and, the broad ends of these slides running in contact with the end plates, forms with the oil a practically gas-tight joint. The slides are also provided with nose strips of special design, giving broad surface contact against the walls of the compressor cylinder. As there is no end-thrust on the slides, there is practically no cause for wear over these broad ends; and the nose strips are automatically kept up to their work by springs in the usual way. The efficiency of the machines is therefore unaffected by any wear which may take place in the driving-block, which is entirely shut away inside the revolving drum, and cannot affect the gas tightness. The forced lubricators fitted to these machines serve to automatically lubricate all internal working parts.

In the connections to the machines, a relief pressure-valve is arranged as a bye-pass between the inlet and outlet mains. If, therefore, they cease taking gas at the Cray works, and shut down their valve, this relief-valve opens, and thus prevents the pressure rising to a height beyond the limit to which the valve is set. The valve also secures that the gas pumped through the high-pressure main to the Crays works is at a steady rate irrespective of the speed of the compressors; and should the compressors for any reason be running beyond their normal speed, the valve would relieve as soon as the outlet pressure at Bromley exceeded a given limit, so that the gas would continue to be pumped into the holders at the Cray works at the normal rate.

As before stated, the compressors are each capable of passing 30,000 cubic feet per hour at a pressure of 10 lbs. per square inch; and they deliver and pass the gas through a newly laid Mannesmann steel main, 8 inches in diameter and 5½ miles long, which runs from the Bromley works through Chislehurst to the St. Mary Cray works, where the gas passes through the works station meter, and into the holders, being then distributed through the Crays system of governors and canalization in the usual way. This main is coated with jute covering and special asphalt.

The joints are on the rigid principle; the socket end of the pipes being provided with a recess beyond its depth, 10 inches long, and of a diameter to the exact size of the spigot end of the pipe. The spigot is driven into this recess by heavy rams; and as they are thus a dead-fit, no yarning is necessary. The joint is then made by caulking the sockets full from end to end with lead wool. This provides a very sound joint; and the main before being put into use was successfully tested to over 50 lbs. per square inch.

From this description of the more recent changes at the Bromley works, made in order to meet the requirements of the annexed area of supply, it will be seen that concentration of manufacture at the larger works has greatly added to their importance, to the responsibility of management, and to the technical interest always to be found there. We congratulate the Company and the Chief Engineer on so promptly establishing themselves on a settled line of working under the new conditions brought about by the extension of operations through the recent fusion; and at the same time we thank Mr. Woodward for the facilities afforded in obtaining particulars and illustrations for this article.

ITALIAN GAS-WORKS' RESULTS IN 1908.

THE February issue of our contemporary "Il Gaz" contained a table of figures, taken from the official report of the Ministry of Agriculture, Industry, and Commerce in Italy, relating to the results of gas-works' operations in that country for the year 1908. As the figures may be of interest to some of our readers, who may not easily have access to such records, we append a selection of the results obtained.

It will be seen that a total of 190 gas-works carbonized 1,058,290 (metric) tons of coal, producing 307,464,154 cubic metres of gas, which works out at about the equivalent of a make of 10,406 cubic feet of gas per English ton of coal. The coke produced amounted to 704,454 (metric) tons, or over 66 per cent. of the coal carbonized. The total tar production was 51,107 (metric) tons, or 4·8 per cent. The average cost of the coal was 28 lire per ton, which may be taken, roughly, at about 22s. 6d. Coke fetched, on an average, 40 lire, or (say) 32s., per ton. The average sale price of gas was 0·187 lira per cubic metre; the English equivalent of which would be about 4s. 2½d. per 1000 cubic feet.

Figures relating to the Carbonization of Coal in Italy in 1908.

Name of District.	Number of Gas-Works in District.	Coal Carbonized. Tons.	Gas Made. Cubic Metres.	Average Sale Price per Cubic Metre.	Coke Made. Tons.	Average Sale Price per Ton.	Tar Produced. Tons.	Average Sale Price per Ton.	Number of Workmen.
				Lire.		Lire.		Lire.	
Alessandria	11	27,636	7,387,555	0·1635	19,069	41·60	1,194	26·10	156
Cuneo	8	13,077	2,925,800	0·185	8,525	46·20	506	27·83	77
Novara	7	13,474	3,803,230	0·180	7,691	41·20	554	27·70	86
Torino	9	148,565	42,341,870	0·111	89,800	47·80	7,400	29·20	893
Bari	2	7,936	2,226,112	0·1431	5,674	35·96	313	35·32	85
Caserta	2	3,511	923,270	0·184	1,972	22·59	140	26·92	35
Foggia	1	6,544	1,762,800	0·157	4,211	40·00	262	56 20	65
Lecce	1	3,869	1,109,480	0·15	2,634	36·60	191	51·00	38
Napoli	4	78,749	21,752,300	0·186	55,018	24·75	3,831	26·30	266
Reggio Calabria	1	2,229	497,000	0·11	1,586	43·90	96	42·00	35
Salerno	2	2.779	1,021,565	0·1785	2,609	28·20	153	28·80	23
Catanzaro	1	1,509	413,570	0·2485	980	35·60	47	30·50	15
Bergamo	4		2,230,020	0·16	5,123	42·72	296	26·00	50
Brescia	4		2,496,607	0·181	5,450	43·70	350	24·30	84
Como	17	293,329	5,687,820	0·184	12,084	45·57	856	30·00	135
Cremona	2		2,072,360	0·208	4,800	45·00	370	24·35	60
Milano	29		75,951,477	0 15	161,325	41·28	12,150	29·43	1,287
Pavia	5		3,512,287	0·184	7,650	45·83	522	32·62	78
Bologna	21	76,000	21,700,000	0·19	52,000	43·70	3,500	33·70	549
Cagliari Sassari	4	8,685	2,070,538	0·25	5,498	36·00	375	50·00	78
Caltanissetta	7	62,324	17,864,596	0·22	42,710	28·20	2,786	21·40	265
Chieti	1	66,700	351,000	0·21	900	44·00	51	29·00	13
Roma	5		23,073,911	0·197	44,050	36·77	4,249	32·07	658
Ferrara	2	6,800	1,760,000	0·202	4,500	50·00	202	30·00	37
Mantova	1	6,245	1,705,500	0·169	4,030	44·80	250	28·00	32
Padova	2	19,163	5,179,780	0·1565	14,057	45·50	1,183	38·10	140
Rovigo	3	3,088	743,277	0·22	1,888	47·20	147	43·30	23
Treviso	2	4,000	1,140,950	0 1705	2,600	45·50	180	29·00	27
Udine	1	2,500	650,000	0·20	1,750	48·00	80	30·00	22
Venezia	3	29,120	6,865,560	0·152	16,284	40·00	1,144	30·20	150
Verona	3	10,389	3,057,580	0·2165	6,491	39·00	487	30·90	159
Vicenza	3	6,072	1,608,000	0·18	3,000	40·00	240	27·40	40
Firenze	2		7,524,456	0·266	16,767	40·42	1,016	30·00	169
Livorno	1	42,390	3,138,570	0·17	7,875	38·50	560	30·00	65
Pisa	1		1,577,920	0·21	3,940	40·00	222	30·00	27
Siena	1		516,240	0·25	1,373	35·00	79	30·00	15
Genova	10		25,891,751	0·188	69,568	36·29	4,587	32·91	771
Lucca	1	111,607	950,425	0·172	2,768	40·00	156	30·00	32
Massa-Carrara	2		480,778	0·219	1,567	39·68	97	28·78	15
Porto Maurizio	4		1,498,199	0·216	4,637	38·11	285	29·84	37
Totals	190	1,058,290	307,464,154	..	704,454	..	51,107	..	6,792

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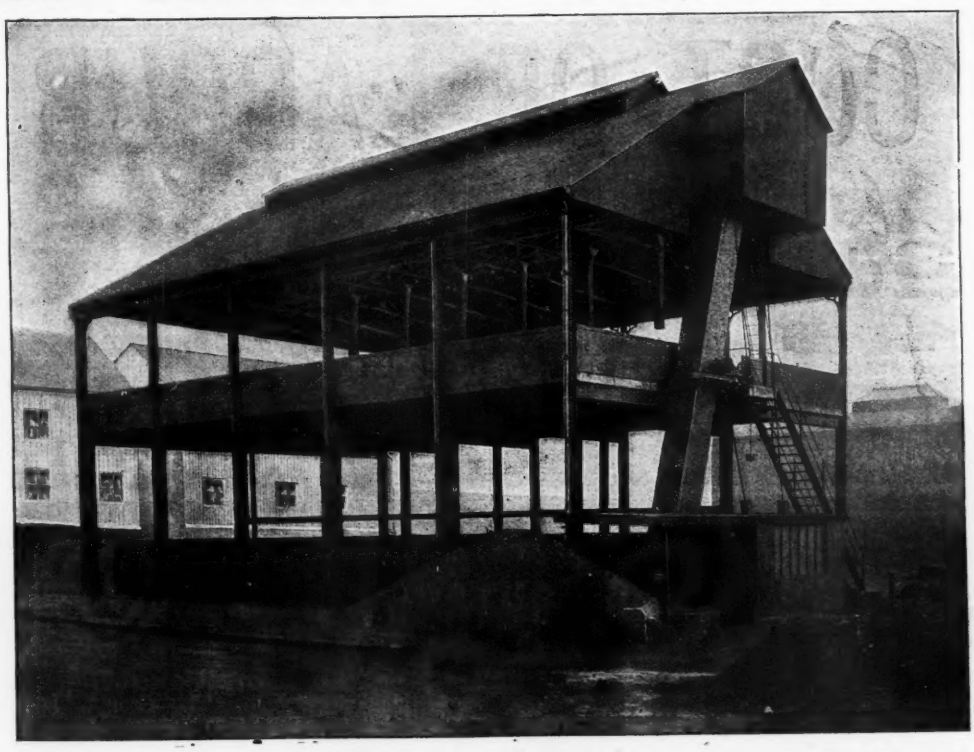

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See "JOURNAL OF GAS LIGHTING," Nov. 2, 1909.

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ILLUMINATING ENGINEERING IN AMERICA.

A Year's Progress.

THE number of our American contemporary the "Illuminating Engineer" for the current month opens with an article by the Editor (Mr. E. Leavenworth Elliott) on "The Year's Progress in Illuminating Engineering," in which he shows what has been done to advance the science commercially and scientifically. It follows an introductory note by the same writer, expressing his gratification that the publication has reached its fourth anniversary, and stating that the work done has been satisfactory beyond the most sanguine expectations. The first object in starting the publication—the establishment of illuminating engineering as a distinct profession and division of applied science—has, he says, been accomplished. The next great work is the more arduous one of leading the public to avail themsleves of the advantages of better illumination made possible by the achievement of this object. They have to be led up to an appreciation of them by an often slow and laborious process of education; but, fortunately, they are much more ready to hear and to learn now than they were in the past.

Leaving Mr. Elliott's introductory remarks, we turn to what he has to say on the progress of illuminating engineering. He begins by quoting the predictions made in his summary a year ago, which were to the effect that progress would probably be most pronounced on the following lines: First of all, the installation of better systems of street lighting, both from the decorative and practical standards; secondly, more "aggressive action" on the part of the gas interests to maintain the present status of gas lighting; next, more extended recognition of illuminating engineering principles in both the manufacture and sale of lighting fixtures and accessories; and, finally, the continued increase in the recognition of illuminating engineering by those largely interested in the subject of illumination, including users of light, architects, contractors, and producers of luminants.

That these predictions have been very largely fulfilled is now, the writer says, a matter of record. The movement for decorative and spectacular street lighting has not only held the centre of the stage, but has attracted attention from every part of the country and from every class of municipality, from the remote country village to cities of the first magnitude; and there are no present signs of abatement. He frankly acknowledges that some of the installations have been conceived in enthusiasm and executed in haste, with the inevitable result that they will be more or less short-lived; not that the better illumination itself will be discarded, but that systems more in keeping with the dignity of a permanent public improvement will be eventually put in. To have made the start, however, is the important thing. In one of its spasmodic reform administrations, New York City had the good fortune to stumble on to a man who cleaned its streets, so that the citizens for the first time in its history had an example of what cleanliness meant; and no administration since has ever dared to go back to the old conditions of filth, nor is there any possibility of such an eventuality in the future. So in the case of public lighting. When once the streets have been lighted up, and the citizens have had an object-lesson in what modern illumination means, they will never go back to the old *régime* of darkness and gloom. Cities of the first class that have carried out extensive modern lighting equipment are Boston, Philadelphia, Chicago, St. Louis, Seattle, and Atlanta, while installations put into smaller cities and towns are numbered by scores. These special lighting installations form a sort of electric sign for the city as a whole; and the movement for better light is still being generally carried on through the initiative and efforts of local boards of trade or civic organizations. At first undertaken often in a spirit of rivalry, it has now come to be more a matter of self-preservation—not in the literal sense of preventing the downfall of the city, but in preserving its prestige and reputation for thrift and progressiveness. Looking at these results, Mr. Elliott considers that his first prophecy of a year has been fulfilled to the letter.

The progress predicted for illuminating engineering in the field of gas lighting has also, he says, been realized. The Welsbach Company, who hold the foremost place in the production of gas lighting apparatus, have established an illuminating engineering department, with one of the best American illuminating engineers at its head, and have been doing excellent work. Papers touching on various phases of illuminating engineering as connected with gas lighting have been presented at all the meetings and conventions of the various organizations connected with the gas industry. There has been a very large accession of members to the Illuminating Engineering Society from the ranks of the gas men; and there is no doubt as to the actual awakening of interest in the subject in this branch of the lighting field. Consequently, the second prediction has proved true.

In the fixture trade, the progress of illuminating engineering has been less marked, though by no means imperceptible. Mr. Elliott attributes this to a considerable extent to the absolute lack of organization and co-operation among the manufacturers. Efforts have been made to remove this anomalous condition of affairs; but apparently without success. He says that as yet no single firm or individual has appeared with sufficient moral strength and conviction to come out into the open, and follow the path of progress so clearly indicated by the march of collateral interests. He admits that there are peculiar difficulties in the way which will have to be removed or ameliorated before real progress can be made. There is no doubt, however, that there was some awakening on the subject during the past twelve months; and as reforms generally grow in a geometrical ratio, he thinks it safe to predict that a larger amount of interest will be shown in the current year.

Coming to the final prediction—as to the growth of illuminating engineering as a science and a profession, and its acceptance as such by the other engineering professions and the public at large—Mr. Elliott says it has been realized to an extent which may well cheer the heart of the prophet. Among the most conspicuous evidences of this may be mentioned the marked prosperity and progress of the American Illuminating Engineering Society, as shown in its increased membership, stronger financial position, and the greater number and better average quality of the papers and discussions presented at its meetings; the final organization of the British Illuminating Engineering Society, with Professor Silvanus P. Thompson as President, with a roll of distinguished Vice-Presidents; the greater number and better quality of articles on subjects pertaining to illumination in the trade and technical Press; the appearance of several standard works on various branches of the subject by competent authors; the greater extent to which illumination curves and other technical data are used in commercial literature; the elimination of much of the sporadic effort to acquire or use the science without due knowledge or preparation, and a more serious, painstaking, and scholarly view of the profession by those who have assumed the title of illuminating engineer.

Mr. Elliott says that in the development of light-sources, the past year brought forth nothing essentially new. In gas lighting, the inverted burner became a standard; there being no longer any question as to its successful use under average American conditions. Its application to the so-called "gas-arcs" was brought to commercial success. High-pressure gas lighting, which made steady progress elsewhere, was the subject of only a few desultory experiments in America; and the writer says there are no immediate signs of its becoming a factor in either public or private lighting installations. The question of distance lighting, which has also reached the commercial stage abroad, does not appear to have been experimented with to any extent in America. Some very needful attention has been given to the subject of modernizing gas-fittings; and in connection with this the methods of lighting and extinguishing gas without the use of the troublesome match have also received consideration. The different methods of electric lighting gas-burners have been worked upon, apparently with such success that very much improved and more practical forms will soon appear on the market.

After offering a few remarks on electric lamps, glassware, and car lighting, Mr. Elliott passes on to deal briefly with acetylene and gasolene, which he says "afford to the smallest isolated installations the means of securing an illumination equal to that furnished by the largest of central stations and gas companies." He then makes a few predictions for the current year. He thinks it is safe to prophesy that the lead will be taken in the direction of better street and public lighting; and that next to this, industrial lighting will come in for a "general overhauling." With the full return of prosperity, and its attendant necessity for overtime and double-shift work, additional importance attaches to the latter field of illumination. We learn, on the authority of Mr. Elliott, that for the first time in history a definite move in the direction of regulating industrial lighting by legal enactment is to be made; a Bill now being prepared for introduction into the New York State Legislature covering the subject, and providing that the lighting shall be subject to inspection by the proper authorities along with the other matters affecting the health and safety of employees.

In conclusion, Mr. Elliott considers that in the development of new means of producing light nothing of a radical nature is in sight. With the number and character of scientists experimenting in this line, however, a discovery which may ultimately place all our modern methods in the shade may, he thinks, be announced at any time. On the other hand, another quarter-of-a-century may pass without anything further developing than improvements in the method of manufacture. With regard to illuminating engineering, he considers that its progress has now "settled down into a steady gait, which will surely not slacken during the coming year." It is established beyond all question; and it only remains to maintain a healthy growth along with other professions.

Mr. James Paterson, M.A., the Engineer and General Manager of the Redhill Gas Company, and the Hon. Secretary and Treasurer of the Southern District Association of Gas Managers, of which he is the immediate Past-President, has been appointed General Assistant to his father, Mr. R. Ormiston Paterson, the Engineer and Manager of the Cheltenham Gas Company, and will leave Redhill at the end of June. Mr. Paterson has been there seven years, having been selected in March, 1903, to succeed Mr. Douglas H. Helps, who then became Engineer and Manager of the Reading Gas Company. Before going to Redhill, Mr. Paterson filled the position of Assistant-Engineer to the Gloucester Gas Company. His work at Redhill has given entire satisfaction to his Directors; and we cordially wish him equal success in the discharge of the duties incidental to the new position he has now been called upon to fill. Mr. Paterson obtained his degree at Cambridge in 1901.

OBLIQUE & HORIZONTAL CHAMBER SETTINGS.

The German Company carrying on business under the title of the Ofenbau-Gesellschaft m.b.H. have taken out French patents for settings of oblique and horizontal chambers suitable for the carbonization of coal and other materials. They are shown in the following illustrations.

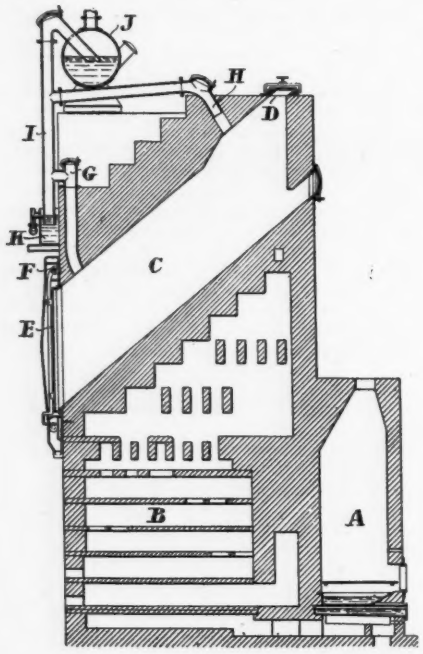


Fig. 1.

In the arrangement fig. 1, the object of the patentees has been to produce a setting in which the carbonizing chamber will be relieved as much as possible from the high pressure to which it is subjected during the distillation of heavy charges, and the resulting gases conveyed quickly away. This object is attained by providing the sloping roof of the chamber with two gas outlet-pipes both in connection with the same tar-receiver. The chamber is heated by the generator furnace A, the gases from which mix with the preheated air coming from the regenerator B, and burn in the well-known manner. The hot gases are conducted along the side walls of the carbonizing chamber C, at the top of which is a charging-hole D, which can be closed by the lid shown, while the opening E for discharging the chamber is closed by a door turning upon an axis F. From the lower part of the roof of the chamber rises the outlet-pipe G, and from the upper part the pipe H. The former is connected with the pipe I, leading to the tar-vessel J; so that the cleaning of the ascension-pipe, which is provided with a cover, is greatly facilitated. The pipe H opens into this pipe, the lower end of which dips into the water-seal shown at K; this vessel serving as a receptacle for the pitch and tar separating from the gas.

The other invention patented by the Company is a setting having either horizontal or oblique chambers, as in fig. 2.

The object here is to heat the walls of each combustion chamber in such a way as to avoid heating very highly the gases collecting in the upper parts, and also to prevent the formation of carbon there. This object is attained by having on the sides of the chambers gas-heating channels running longitudinally, which can, if necessary, be either isolated or in groups. They are arranged one above the other, and can be inspected through sight-holes in the wall on the charging side of the furnace, for the purpose of regulating the heat.

Fig. 2 is a vertical section of a setting with gas-heating channels, with a transverse section on the line X X. The setting is heated by the generator A, the gases from which pass upwards by way of the channel B, the chamber C, and the channel D to mingle in the vertical channels E and burn with the preheated air coming from the channel F of the regenerator G. In front of the channels E, and arranged on the two sides of each combustion chamber H, are other channels I, which are separated from the channels E by a partition J, provided with openings as shown. The channels I communicate with the channel F, and convey to the hot gases rising in the channel E, at various heights, fresh quantities of air.

Starting from the channels E are hot-gas channels K running in a longitudinal direction, and separated from each other by partitions as shown. Their purpose is to heat the sides of the chambers H, and they may be formed singly or in groups as needed for regulating the flow of the hot gases to the various parts of the setting. In the arrangement shown, the upper channels K may be entirely or partially closed by the slide L. The lower channels are closed below upon the transverse channel M, running

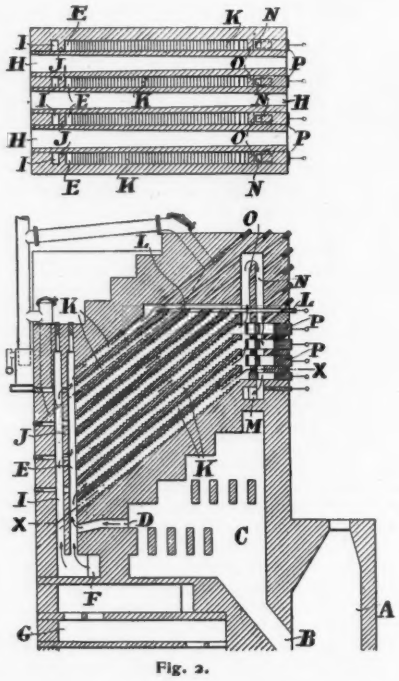


Fig. 2.

towards the discharging channel N by a baffle-plate O, in order that they may not be subjected to too strong a current of air. The baffle-plate is perforated, and serves for guiding the perforated registers P, by the aid of which the lower channels may be closed singly, if required. These registers are so perforated that, even when the corresponding hot-gas channel is closed, the suction of the hot gases by the other channels in the direction of the arrows is not interfered with. On the charging side of the setting, sight-holes are arranged in the wall, to enable the gas channels to be inspected while at work. It is preferable for the capacity of the individual carbonizing chambers H to be reduced in the direction of the course of the hot gases, in order that the bulk of the charge may decrease in the same direction, to accord with the lowering of the heat from the bottom upwards.

DISTILLATION OF WATER-GAS TAR AND ANALYSIS OF OIL GAS.

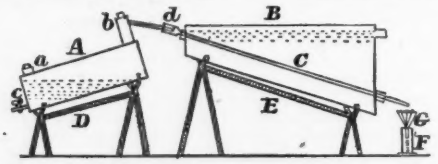
By E. C. Uhlig,
Chemist at the Citizens' Gas-Works, Brooklyn, New York.

[Papers Read before the New York Section of the Society of Chemical Industry.*]

APPARATUS FOR DISTILLING WATER-GAS TAR.

Great difficulty has always been found in carrying out distillations of water-gas tar, especially when the operation was conducted in a glass flask. The tar will bump, break the flask, and cause not only loss of time, but also danger to the operator and damage to his clothing.

This apparatus was designed to overcome these difficulties and supply a rapid and ready method to ascertain the percentage of water a tar may contain; thus furnishing a means of knowing the efficiency of the settling-tanks. It was constructed by the



works blacksmith, and consists (as shown) of a wrought-iron pipe A, 12 inches long and 2½ inches internal diameter, with plugs welded into the ends. It has a 1-inch nipple *a* closed with a screw-plug, and another 1-inch nipple *b*, about 2 inches long, closed with a cork, and having a bent piece of ½-inch pipe *d* connecting with the condenser C. A cock *c* allows the retort to be emptied of the pitch left after the distillation is finished. D is a stand, made of wrought iron, supporting A in an inclined position. The object of the cork in *b* is to allow the insertion of a thermometer when a fractional distillation is to be made, and to provide a vent in case of an explosion in A allowing the cork to blow out. This has heretofore not happened, as the explosions have been so weak that their force has been directed through the condenser tube C.

* Reprinted from the Society's "Journal."

The retort A may be attached to an ordinary Liebig condenser; but the condenser shown in the figure is used because a burner may be placed under E to heat the water around C when naphthalene oils are coming off. The tube C passes through a copper box which has water running through it. C is 30 inches long, and the box has the following dimensions: Upper side, 16 inches; bottom, 26 inches; sides, 3 inches and 6 inches; width, 2½ inches. It is supported by a wrought-iron stand E, similar in construction to D. A graduated cylinder F supports a glass funnel G, in which is placed a piece of wet filter-paper which acts as a separator for the oil and water dropping from C—the water passing through into F, where its volume may be read, while the oil remains on the paper.

To use the apparatus, the plug in *a* is unscrewed, the tar weighed in the can in which it comes, and some tar (about 300 grammes) poured into A. The can is reweighed—the difference in weight being the tar to be distilled. The plug is then screwed into *a*, and *d* is connected from C by a perforated cork. The dotted lines show the position of the tar in the retort. A triple bunsen burner is placed under D at the end nearest the condenser, and as the distillation proceeds the burner is moved toward the other end. This movement is gradually done, and when the other end is reached the flame is increased, and the heating continued until no more water is seen dropping into the funnel. The burner is extinguished, and after waiting a short time to allow the retort to cool somewhat, the cock *c* is opened, and the warm pitch allowed to run out. The volume of water in F multiplied by 100 and divided by the weight of tar taken gives the percentage of water in the tar.

If naphthalene should form in C, it can be readily pushed out with a piece of cotton on the end of a long wire. Naphthalene does not appear until all the water has been driven off the tar; so this cleaning-out is done when the operation is finished. In case of a fractional distillation where naphthalene was one of the constituents to be determined, the water in the copper box would be heated when this point was reached.

The great advantage of this apparatus, apart from the impossibility of breakage, is the manner in which the heat is applied to the tar. It will be noticed that the tar is first heated where it is shallowest, and as the distillation goes on, at the deeper parts. This ensures quiet distillation, and prevents bumping.

When the retort becomes stopped with pitch from many distillations adhering to the inside, and cleaning is necessary, the parts *a*, *b*, and *c* are unscrewed, the retort taken from the support D, and placed in a forge fire, where it can be heated till all the pitch is burned out. The parts are then reassembled.

Water-gas tar containing upward of 75 per cent. water has been distilled with this apparatus without loss of material or danger to the operator.

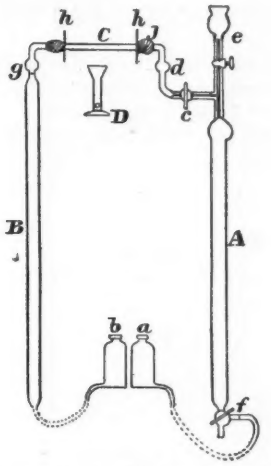
OIL-GAS ANALYSIS APPARATUS.

This apparatus was designed for gases in which the methane is in greater proportion than the hydrogen. It is based on the observation of E. Jaeger that when a mixture of methane and hydrogen is passed through copper oxide at 250° C. the hydrogen is burned to water; the contraction in volume being a direct measure of the hydrogen that was present, while the methane is unchanged until the copper oxide is heated to redness, when it is burned to carbon dioxide, which may be absorbed in sodium hydroxide. The residue of gas left after combustion and absorption is then read, added to the other constituents, and the sum subtracted from 100 gives the methane. This apparatus has been used for gases made by decomposing oil in retorts. These gases are of the following type:—

	Per Cent.		Per Cent.
Carbon dioxide	0·0	..	0·0
Illuminants	54·2	..	45·4
Oxygen	0·4	..	0·4
Carbon monoxide	0·3	..	1·2
Hydrogen	9·8	..	5·0
Methane	32·8	..	43·6
Nitrogen	2·5	..	4·4

The apparatus consists of an absorption tube A, similar to that used on the Elliott apparatus, but having the part *c d* in addition. This part is made of tubing 1 mm. internal diameter to the bottom of the upright part *d*, which has an internal diameter of 6 mm. and an external diameter of 10 mm.; the bulb being 15 mm. external diameter. The tube A may be graduated. The tube B is 100 c.c. capacity, and is graduated in 0·1 c.c. It is contracted below the bulb *g*, which is 15 mm. external diameter. The part above *g* is 6 mm. internal and 10 mm. external diameter. C is a quartz tube filled with fine granular copper oxide, and the ends are stopped with plugs of asbestos fibre. The connection of A and B is made with rubber tubing wired on, and covered with wet lamp-wick shown at *j*. This wick must be kept wet during the combustion by running water over it. Two discs of asbestos board through which the tube C passes are shown at *h h*. The tube C is heated by the burner D.

To prepare the apparatus, the tubes A and B are filled with water by raising the bottles *a* and *b*, which are attached to the tubes by rubber tubing. The next step is to fill the apparatus from the cock *c* to the narrow part under *g* with atmospheric nitrogen. This is done by lowering the bottle *a* and opening the cock *e*; thus admitting air into A. Cock *e* is then closed, and the funnel filled with sodium pyrogallate solution, which is gradually allowed to flow into A. When all the oxygen has been removed from the air in A, the cock *c* is opened, and the nitrogen passed from A to B and back several times, applying some pyrogallol solution



when the nitrogen is in A. Finally, the bottle *b* is raised so that the level of its water is at the narrow part of B under *g*. When the water in B is at this mark, the cock *c* is closed, the three-way cock *f* opened to drain A, and *e* also opened. The tube A is then emptied, and washed out with water admitted through the funnel; and the bottle *a* is emptied, washed out, and filled with fresh water. It is then raised above *e*, and when A is full of water the cock *e* is closed. The apparatus is now ready for the gas which is to be analyzed.

The funnel is removed, and the gas admitted to A. When a little more than 100 c.c. of the gas has been admitted to A, the cock *e* is closed and the funnel replaced. The excess of gas over 100 c.c. is expelled, and the volume adjusted in the usual manner. We now have 100 c.c. of gas in A, and proceed to make the absorptions in the same manner as in the Elliott apparatus; admitting the reagents in turn through the funnel. The tube A being graduated, the various contractions are read on it. When all the constituents of the gas have been determined except hydrogen, methane, and nitrogen, the residual gas is passed into B and the cock *c* closed. A and *a* are now washed out and refilled with fresh water. The burner D is lighted, and a small flame permitted to burn about 3 inches below C. The gas is passed from B to A and back about six or eight times. The burner is removed, and water run over C to cool the gas. When cool to room temperature, a reading is taken by raising *b* until its water-level coincides with the water-level in B. The heating and cooling may be repeated to ensure that all the hydrogen is burnt. The contraction found gives the hydrogen. The burner D is replaced, and C raised to a red heat. The funnel is filled with sodium hydroxide solution (10 per cent.), and the gas passed from B to A and back. When in A, the cock *c* is closed and some sodium hydroxide admitted. This is continued until no further contraction is observed in the volume of gas. The burner is removed, and the tube C cooled with water as before. When at room temperature, a reading is taken of the gas in B; and this gives the nitrogen. The sum of the constituents subtracted from 100 gives the methane. Any ethane is burnt, and reported as methane.

This apparatus, as originally used, had a platinum tube at C; but it was found that the reduced copper alloyed with the platinum, and this caused the tube to crack. A quartz tube was tried, and found to answer very well. It may be heated to redness and suddenly cooled with water without danger of cracking; and neither copper nor copper oxide has any effect upon it. It may be readily cleaned by immersing in *aqua regia* in a test-tube; allowing it to stand over night, washing out with water, and drying in a flame. It then can be cooled and refilled with copper oxide.

When an analysis is finished, the tube C is heated again to redness, and air passed through. This oxidizes the reduced copper to copper oxide. The last of the oxide is then removed by pyrogallol, and the water-level in B adjusted to the narrow part as before. A and *a* are emptied, washed out, and refilled with water, and the apparatus is ready for the next analysis.

The following comparisons were made of results from this apparatus and from an Elliott apparatus. A portion of the residual gas from the latter apparatus was passed into A by a capillary tube, and the combustions made as above described.

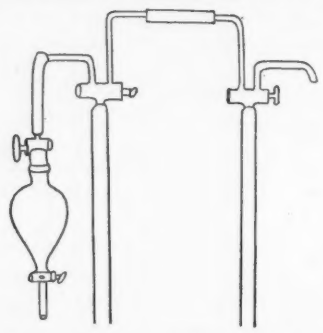
	Elliott. Per Cent.		Copper Oxide Apparatus. Per Cent.		Difference. er Cent.
Hydrogen	32·5	..	32·7	..	0·2
Methane	17·9	..	18·8	..	0·9
Nitrogen	4·6	..	5·3	..	0·7

Mr. Henry Rule, Assistant-Manager at the Falkirk Corporation Gas-Works, has been appointed Gas Manager of the Kelty Gas Company, Limited, in succession to Mr. James Dickson, who, as announced in the "JOURNAL" a fortnight ago, has obtained the position of Gas Manager of the Forfar Corporation. Mr. Rule is President of the Eastern Division of the Scottish Junior Gas Association; and this is the second promotion from the ranks of this branch of the Association within the past few weeks.

SIMPLE EUDIOMETER FOR GAS ANALYSIS.

At a Meeting of the Yorkshire Section of the Society of Chemical Industry, a paper was submitted by Messrs. F. W. Richardson and A. Jaffé, in which they described a simplified form of eudiometer for general gas analysis. The paper, with some notes of the few remarks upon it, appeared in a recent number of the Society's "Journal," from which the following portions of it are reproduced.

The illustration will suffice to show the simple modification of, and addition to, the ordinary nitrometer. The side flask with its stoppered thistle funnel and small reflux bulb, or the bulb made from an ordinary pear-shaped separator, is exhausted of its air by means of a Geissler glass filter-pump. Any small amount of residual air is now removed by means of the mercury columns of the eudiometer. In this manner a perfect vacuum can be obtained. The entire absence of air or gas of any kind is a desirable feature in a number of operations. By means of the side bulb *in vacuo*, the estimation of gases dissolved in water is easily



done. The bulb, with the measured volume of water, is immersed in water at about 80° C. The gases are soon extracted and removed to the more remote tube, or laboratory vessel. Into this the usual solutions for removing the carbon dioxide and then the oxygen are admitted, and these gases are calculated from the losses observed. A well boiled and cooled water was shaken vigorously with air until presumably saturated. In our eudiometer, a rapid estimation of the dissolved gases measured at 0° C. and 760 mm. showed 0·64 per cent. of oxygen and 1·32 per cent. of nitrogen—the amounts observed by various authorities.

Where the quantity of gas dissolved in a water is very small, quite a large flask may be used for the extraction. We use a 500 c.c. flask, and insert a perforated rubber cork bearing a stoppered glass tube. After producing a complete vacuum, a known volume—some 400 c.c.—of the water is allowed to enter the flask. At a temperature of about 80° C., the whole of the gases can now be extracted and transferred to the laboratory tube. If the perforated rubber cork containing the straight tube with stopper is inserted into a large pear-shaped separator with the terminal tube cut short, we are able not merely to estimate the dissolved gases in the water, but also to determine the amount of combined carbon dioxide. A few cubic centimetres of normal sulphuric acid are allowed to enter by the bottom tap to liberate this carbon dioxide. That the estimation can be accurately made is shown by the fact that 0·2514 gramme of pure monocarbonate of sodium, after solution in gas-free water, gave carbon dioxide corresponding to 100·1 per cent. of Na_2CO_3 in the sample taken.

For the analysis of such complex mixtures as coal gas, we have used the excellent eudiometer devised by Dr. Bone; but this piece of apparatus is complex, and requires careful handling. Moreover, it is expensive. By attaching a gas explosion burette to the side outlet from the laboratory tube, we are able to make a fairly accurate analysis of coal gas. The carbon dioxide is first absorbed by potassium hydroxide, the oxygen by pyrogallate, and the olefines by bromine water. As the bromine acts upon the mercury and produces a species of scum which interferes with the readings, we tried several chemicals to remove the mercury bromide; and at last we found potassium cyanide effected this completely. Of course, all cyanide must be subsequently washed out of the eudiometer.

The following figures show a comparison between the results obtained from the analysis of a coal gas by Dr. Bone's apparatus and our eudiometer:—

	Bone.		Richardson and Jaffé.
Hydrogen	47·19	..	48·02
Methane	37·22	..	37·81
Hydrocarbons (C_nH_{2n})	5·01	..	5·04
Carbon dioxide	1·39	..	1·17
Carbon monoxide	6·79	..	6·58
Oxygen	0·18	..	trace
Nitrogen (by difference)	2·22	..	1·38

This year's meeting of the American Gas Institute will—according to an intimation just issued by the Secretary, Mr. A. B. Beadle—be held in New York City.

REGISTER OF PATENTS.

Manufacture of Incandescent Mantles.

Still, W. M., and Adamson, A. G., of Hatton Garden, E.C.

No. 25,549; Nov. 26, 1908.

This invention has reference to the manufacture of incandescent mantles, and has for its objects to obviate uncertainty of results and waste of material, to reduce to a minimum the time taken to complete the process, and to produce a mantle finer in structure and more tenacious in character than that usually obtained by other processes.

The improvements relate to various steps in the process of manufacture and to the method of carrying out the process. One improvement is the use of a mixture of steam with a gas (such as ammonia), or with the vapour of any organic base capable of converting the salts of the rare earths into oxides, such as pyridine or the like, or an admixture of such, as a precipitant wherewith to precipitate the oxides from the nitrate salts held in the body of the impregnated fabric. Another improvement is the use of such gases or vapours without steam as precipitants for converting into oxides the salts in the body of fabric contained in a vacuum chamber. Still another improvement is the treatment of the fabric, before its impregnation with the salts of the rare earths, with steam, so as to expand its strands and open its fibres.

Manufacturing Incandescent Gas Mantles.

Robin, J. I., of Tooting, S.W.

No. 5093; March 2, 1909.

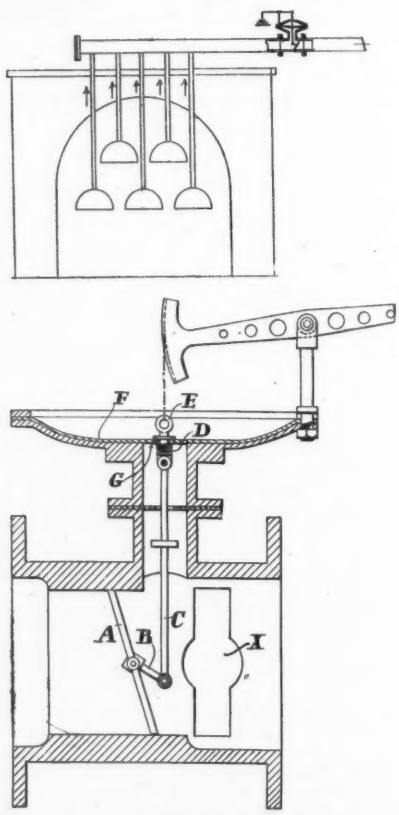
This invention relates more particularly to a method in which the incandescent gas mantle stocking is mounted and clipped upon two mandrels arranged in alignment with one another; the object being to enable this method of manufacture "to be adopted in such a manner as to facilitate accurate and rapid manipulation by the operator, whereby a greatly increased output per operator can be effected."

Governor for Regulating the Flow of Gas in the Foul-Gas Main.

Reeson, J. N., of Beckton.

No. 5278; March 4, 1909.

This invention, relating to the automatic regulation of the flow of gas in the foul-gas main, consists in the use of a special valve or governor in the foul-gas main, and subject to the same conditions—viz., working under vacuum—for the purpose of keeping a uniform vacuum in the main.



Reeson's Foul-Gas Main Governor.

The illustrations show the valve or governor applied to the foul main, and a vertical section of the valve itself.

The method of obtaining a uniform vacuum is by placing the governor direct in the foul main itself and in the neighbourhood of the retorts, and passing the whole of the gas through the governor valve. In retort-house governing, the valve will be working with the underside of the diaphragm exposed to the action of a partial vacuum; for it is

the degree of this vacuum on the inlet side of the governor which, the patentee points out, controls the working of the valve—the valve taking the position shown when (1) there is a large decrease in the yield of gas from the retorts; or (2) an increase in the speed of the exhauster has caused such an increase in the vacuum as to pull the diaphragm right down and entirely close the valve—thus preventing further withdrawal of gas by the exhauster until sufficient gas has come from the retorts to restore the vacuum to the correct amount.

The valve A may be of throttle or other type, connected by an arm or lever B, link C, socket D, and screw eye E, with the diaphragm F, which on its underside G is open to the gas vacuum. Owing to the high temperature of the gas as it leaves the retorts, and the deleterious impurities it contains, the diaphragm would be quickly destroyed; and to obviate this, the diaphragm is formed of closely woven canvas and rubber cloth " or other suitable material, for the purpose of rendering it impenetrable while readily yielding to the gas vacuum."

The eye of the diaphragm is connected to one end of a pivotal beam, which at its outer end is weighted so as to adjust the valve in its required position. X represents the usual covered hand-hole for access to the valve.

The diaphragm is preferably provided with a cover, which protects it from external injury, and also forms a chamber above it which the air only obtains inlet to, and egress from, through a small hole, " thus cushioning the diaphragm and preventing any jerky movement of the valve during vibrations of pressure of the gas on the side of the diaphragm open to the main."

Bye-Pass for Incandescent Inverted Burners.

FOSTER, H. A., and JACKSON, C., of Tottenham.

No. 6563; March 18, 1909.

This invention has for its salient feature the provision of means whereby a single inverted flame or two horizontal flames are left burning within the mantle—thus "abolishing concussion on the mantle when the same is lit up and increasing the life of the mantle."

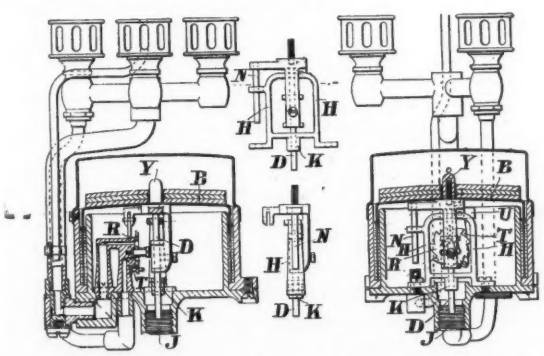
The bye-pass extends from the underside of the gas-cock and passes down through the burner tube to the interior of the mantle. It is perforated at its lower end to admit of a single flame or the two horizontal flames; gas in its passage to the bye-pass being regulated by two adjusting screws which engage in the usual groove of the gas-cock. To prevent the destruction of the lower part of the bye-pass tube, it is made up of two parts connected together—the lower part being of steatite and the upper part of brass, which at its other end is secured to the gas-cock.

Automatic Gas Lighting and Extinguishing Apparatus.

ANDERSON, J., of Edinburgh.

No. 6754; March 20, 1909.

This invention relates to automatic gas lighting and extinguishing appliances, especially those in which a loaded bell provided with a mercury seal is lifted by means of temporary increase in the pressure of the gas in the mains, thereby actuating a device for admitting or preventing the access of gas to the burners.



Anderson's Automatic Lighting and Extinguishing Apparatus.

The part of the guiding means attached to the bell B consists of a bracket fixed to the underside and at the centre of the dome of the bell. At the other end of the bracket is a lug, through which passes a guide-rod D, secured by a set-screw. The guide member attached to the base of the pressure chamber is formed by two upright side pieces H, connected together at each end by a cross piece preferably formed in one. This member is placed directly over the gas-inlet J, and the cross pieces are pierced to form bearings for the rod D. One of the cross pieces of the guide member attached to the base of the pressure chamber (preferably the lower one) is formed with an extension so as to provide a bearing K of relatively great length compared with its diameter; and the length of the guide-rod below is such that, when the bell is raised to its highest position, the rod just extends beyond the end of the lower bearing. The upper cross piece is in close proximity to the top of the bracket, where the latter is fixed to the bell, and the lower cross piece is in close proximity to the base of the pressure chamber. The lug on the bracket, through which the guide-rod passes, is placed between the two cross pieces; and the distance between the under surface of the top cross piece and the top surface of the lug of the bracket, when the bell is in its lowest position, determines the height to which the bell may rise.

One of the uprights H of the guide member attached to the base of the pressure chamber is provided with a slotted lug, in which works another rod N, which prevents any circumferential movement of the bell, and also serves to steady it.

The construction may be modified in many ways—for instance, the guide-rod D may be fixed rigidly to the member attached to the base of the pressure chamber and the bracket carried by the bell be adapted to slide on it. By placing the guide means within the bell, the bearings can be arranged on substantially the same level as the mercury seal, and forces acting to cant the bell are prevented from producing a turning moment, which would cause the bearings to bind. These forces can only produce on the bearings side-pressure, which cannot affect the operation of the apparatus.

A step-by-step valve R, of the rotary disc type, is provided to control the supply of gas to the burners; being operated by a pendulum link T, attached to the dome of the bell itself, or carried by an extension of the bracket attached to the bell. This pendulum link is provided at its point of support with a short arm U, at right angles to the link, and acting as a stop to limit the angular movement of the pendulum link when the apparatus is laid on its side or otherwise placed, thereby ensuring that the link shall assume an operative position when the apparatus is in a working position. The pendulum link is provided, at the end remote from its joint support, with a pin, which engages with ratchet teeth formed on the valve.

An extension Y on the upper side of the bell serves to position weights for loading the bell to correspond with the gas pressure of the service to which the apparatus is connected.

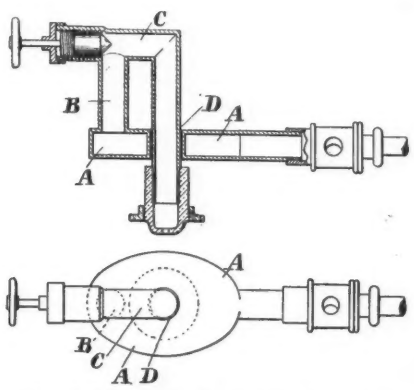
The bell and its mercury seal are enclosed by a cover or cap, which fits closely over the outer wall of the mercury seal, whereby the air contained within the cover cannot escape when the bell rises, except by a small orifice provided for the purpose. This orifice only allows the air to escape slowly; and thus any increases of the gas pressure in the mains, unless of a predetermined value and duration, are prevented from lifting the bell and so lighting or extinguishing the gas at any other time than that required.

Regenerative Gas-Burners.

GLOVER, R. B. G., of Queen Victoria Street, E.C.

No. 10,664; May 5, 1909.

This invention relates to gas-burners in which the gas and air are heated before combustion; the object being to construct the appliance through which the gas and air pass, so that they are "very highly heated," and there is "no possibility of flashing or lighting back at the gas spit."



Glover's Regenerative Incandescent Burner.

The heating chamber proper (as shown) is in the shape of a flat, circular, oval, or other shaped box, having at the edge or at one side a pipe or opening leading to, or for connection with, the gas supply pipe and mixing-chamber A, and to which opening the gas and air inlets may be connected. From the box a pipe B is led—preferably from the side, bottom, or top opposite to the entrance of the gas and air. The pipe is led upwards a certain distance; then curved or brought at right angles as at C towards the centre of the box; and then down through the box at or near the centre as at D, so as to project below the box the required distance. To the end of the pipe D is affixed the burner proper. The pipes B C D are arranged in this way so as to form a syphon, which is said to effectually prevent lighting-back and the explosion of the mixture of air and gas at the burner orifice.

At some convenient point of the syphon is a screw for regulating the flow of air and gas, operated by a thumb-button so as to reduce the area of the passage through the syphon, either by itself or with the aid of a ring as a seating or otherwise.

When used for inverted incandescent gas-lighting, the burner and mantle are placed just under the centre of the box, and, if used for upward flame-gas lighting, the pipe may be extended and curved so that the flame or incandescent body is just under the box.

By this invention, the patentee points out, the heat of the products of combustion plays directly upon the bottom of the box and completely over it, passing up the outer edge, and acting upon the pipe or pipes projecting above the box, so that the whole of the appliance is heated to a great extent, imparting its heat to the gas and air which enter at the side, bottom, or top, pass across or through the box, up and along or round and down the tube to the burner, where the mixture "issues as an atmospheric flame of great intensity, and produces a more brilliant incandescence of the mantle or other filament than has hitherto been obtained."

Automatically Lighting and Extinguishing Street-Lamps.

CLERC, E. C., and BIDAULT, E. A., of Paris.

No. 16,628; July 16, 1909.

This apparatus for lighting and extinguishing gas street-lamps at predetermined times, is said to "work indefinitely without requiring

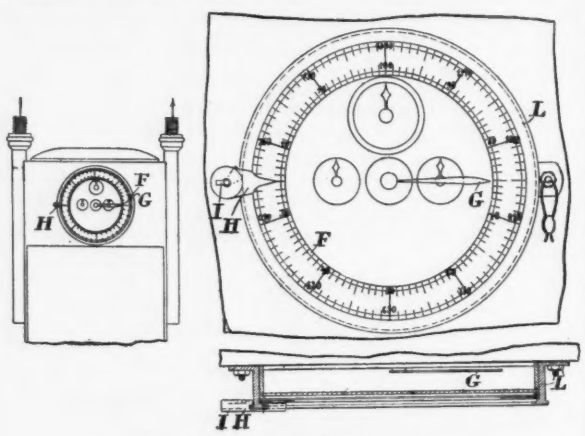
any other attention than the maintenance of the electric battery which suffices to effect its actuation." The apparatus comprises an electromotive device adapted to open and close periodically the cock which governs the supply of gas to the burner; automatic regulating mechanism by means of which the apparatus (once adjusted) lights the gas-burner each day at a definite time, and keeps it alight with due regard to the hour of sunset and the length of the night at the corresponding season of the year; and an electric igniting device which "saves the expense and trouble resulting from the use of a permanent pilot light." The feature of the proposed arrangement is that the cock regulating the passage of the gas is actuated by the fall of a weight raised periodically by pins governed by an arm which receives its actuation from the core of an electro-magnet.

Indicator Scale for Gas-Meters.

FRANK, A., of Charlottenburg, near Berlin.

No. 19,534; Aug. 25, 1909.

The object of this invention is to provide means whereby a gas customer may "readily himself determine his daily, weekly, or other expenditure, or control expenditure in his absence." It consists in a value indicator scale within an enclosed and sealed chamber, and a pointer (adapted to be adjusted exteriorly without breaking the seal of the chamber) to co-act with the value scale to enable the customer to determine the value expended in any desired interval.



Frank's Indicator Scale for Gas-Meters.

The meter shown is provided with a scale F and the corresponding pointer G. The inner scale may represent units of gas used, while the outer one represents the money value of the gas. The scale and pointer are enclosed in a casing L (having a glass face), usually sealed with a lead wafer. In order that the consumer can determine the value of the gas used in any given time, there is an external pointer H, which is adapted to ride on a ledge on the casing L, and may be clamped in any position desired by inserting a key in the opening I. Thus only the possessor of the key can effect adjustment of the indicator pointer H; and this adjustment may be effected without breaking the meter case seal.

Gas-Burners.

BOULT, A. J.; a communication from F. Yockey and J. H. Jones, of Sioux City, U.S.A.

No. 19,962; Aug. 31, 1909.

This invention has particular reference to burners in which the gas supply is automatically cut off after the flame is extinguished, by a valve actuated by expansion and contraction due to changes of temperature. The automatic cut-off consists of a pillar having an opening in one side and with a tube of expansive material secured in the opening. There is a valve in the pillar, and a lever pivoted therein is adapted to control the valve. A wire secured in the tube permits the valve to open by the pressure of gas on it or to hold the valve closed, according as heat is applied to or withdrawn from the tube and the tube consequently expanded or contracted.

Recovery of Bye-Products from Gases.

OTTO AND CO., G. M. B. H., of Dahlhausen a/Ruhr, Germany.

No. 21,010; Sept. 14, 1909. Date claimed under International Convention, Oct. 7, 1908.

In the recovery of bye-products from gases derived from combustibles, the patentees state, it is essential to separate the tar from the gases; and endeavours have recently been made to separate it at a comparatively high temperature, "in order that the gases may be conducted directly into an acid bath for recovery of the ammonia." A very effective separation at a high temperature is afforded by the use of a spray of tar which removes the tar from the gases at a single operation; a few grammes per 100 cubic metres being left after the treatment.

This and other tar-separating processes are, according to the present invention, essentially simplified and facilitated by dealing with the crude gases as they are produced, in two portions—first, a larger portion from which the tar is removed by suitable treatment and then a smaller portion, which, being the last produced, is practically free from tar. This portion is mixed, before it is cooled, with the larger portion after the treatment of the latter for the removal of the tar.

In the carbonization of coal in coke-ovens—that is to say, in coking processes generally—the gases produced during the last period of the process contain little or no tar, because the high temperature of the oven has decomposed the tar into volatile hydrocarbons. It has already been the practice for some purposes to separate the gases produced during the different periods of the carbonization; and devices have been used for separating the gases for different applications, such as lighting and heating.

The invention is said to possess special advantages for separating tar from the gases at a high temperature, since it prevents the condensation of steam and thus favours the direct precipitation of ammonium salts in the saturator. No further details of procedure are given; and the specification concludes with this claim: "In the recovery of bye-products from gases derived from combustibles, dealing with the crude gases in two portions as they are produced in such a manner that a smaller portion, which is that produced last and is substantially free from tar, is mixed before it is cooled with the larger portion after the latter has been freed from tar."

APPLICATIONS FOR LETTERS PATENT.

6178.—SCHMIDT, O., "Regulating cocks." March 11.
6235.—JONES, G. H., "Mantle rods." March 12.
6246.—BREEDEN, J., AND CO., LTD., and BREEDEN, F., "Gas-valves." March 12.
6250.—CUSS, C. T., "Incandescent gas lighting and heating." March 12.
6260.—OECHSLIN, H., "Rotary pumps." March 12.
6282.—WAGENER, E., "Separating tar from hot gas." March 12.
6328.—SCOTT-SNELL, E., "Compressing air for gas-lamps." March 14.
6334.—BOURNE, J. J., "Governor for air-gas generators." March 14.
6396.—DAVIS, H. N., and TWIGG, W. R., "Gas-fires." March 14.
6427.—LYNES, W., "Gas-taps." March 15.
6496.—SANDMANN, F. W., "Gas-fired furnaces." March 15.
6502.—SANDMANN, F. W., "Gas-producers." March 15.
6507.—GLOVER, R. B. G., "Inverted burners." March 15.
6508.—BURSTALL, F. W., and BRITISH PURE FUEL, LTD., "Extracting tar and other bye-products from gases." March 15.
6509.—BURSTALL, F. W., and BRITISH PURE FUEL, LTD., "Improved construction of retort." March 15.
6525.—JONES, J., "Ammonia concentration plant for gas-works." March 15.
6549.—JACKSON, S., "Cutting pipes for branches." March 15.
6556.—PARKINSON AND W. & B. COWAN, LTD., and CHESHIRE, W., "Street-lamps." March 15.
6557.—HARRISON, S. C., "Chandelier-chains." March 15.
6680.—MILLER, W., and NICOLSON, W. B., "Constant pressure gas thermometers." March 17.
6755.—WEIL, J. A., "Suction-producers." March 17.
6786.—OTHMER, E., "Gas-regulators." March 17.
6793.—TULLY, C. B., "Retort-furnaces." March 17.
6806.—WHITE, O. H., and SHARPE, J., "Air-heating devices for gas-burners, stoves, or the like." March 18.
6811.—HARRISON, E. J., "Plate-rack and linen-airer applied to gas cooking-stoves." March 18.
6815.—MARCUS, H., "Conveyors." March 18.
6898.—HUESSENER, K., SCHAEFER, J., and HENSS, E., "Removing the aqueous vapours from dry distillation gases freed from tar and ammonia." March 18.
6899.—HUESSENER, K., SCHAEFER, J., and HENSS, E., "Extracting tar from hot distillation gases by means of tar, gas-water, or both." March 18.
6900.—HUESSENER, K., SCHAEFER, J., and HENSS, E., "Extracting ammoniacal salts from dry distillation gases which have been freed from tar." March 18.
6902.—HEADING, H. J., and WILLIS, T., "Slot-meter box." March 19.
6905.—BURLEY, F. B., and FROUDE, C. E., "Combined table-lamp and telescopic wall-bracket." March 19.
6938.—WADE, J. T., and AUBLETT, HARRY, AND CO., LTD., "Rotary gas or air compressor." March 19.
6950.—SPERRYN, G., and WOOD, W. H., "Taps or cocks." March 19.
6968.—CLARK, W., "Coin-freed meters." A communication from Knauer, Haas, Weichelt, and Elster. March 19.

Position of the Winchcombe Gas Company, Limited.

The Gas Company at Winchcombe, a town of a little over 2000 inhabitants in Gloucestershire, have for some time been in very low water, and have not paid a dividend for fifteen years. Engineers have been brought in in consultation, and some alterations and repairs have been carried out; but money was lacking, and the thorough renovation that was needed has not been done. The concern has been for sale for years, and numerous would-be buyers have come forward, but only to decline further negotiations. The capital of the Company is £1800 (£50 of which has been forfeited by a late shareholder) and £750 of loans and debentures. There are creditors to the value of £587, and debtors estimated to produce £286. A meeting of the shareholders was held last Tuesday, to receive a report of the Directors as to their efforts to effect a sale. The best offer was one of £1350, from Mr. Sheldon, of Ludlow. It was thought that if this were accepted it would allow 22s. 6d. for each £5 share; and the shareholders were urged to accept this, as if the Company were wound up the expenses would absorb all the assets, and there would not be a penny for the shareholders. There were legal difficulties in the way of selling the works bodily; and it was pointed out that if the shareholders would agree individually to sell to Mr. Sheldon, this would answer the purpose. Mr. Sheldon would not do anything unless it was agreed that at least three-fourths of the 350 shares were transferred to him or to his nominees at the price named. It was at once promised that 262 shares should go to this contemplated purchaser, and others, it was thought, would be forthcoming. Mr. Sheldon expressed himself as satisfied, and the concern will be handed over to him as soon as the transfers can be made out and completed. Mr. Sheldon is prepared to spend £1000 on putting the works into an up-to-date condition.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Tuesday, March 22.

WATER SUPPLIES PROTECTION BILL.

Lord DESBOROUGH, in moving the second reading of this Bill, reminded their Lordships that it was read a second time last August. He understood the Government now took a more favourable view of the Bill than they did on that occasion. The first principle of the measure was that no water company should sink wells or construct works for obtaining a supply unless these and their sites had been expressly approved by Parliament; the second was that compensation should be due to owners of private supplies which were injured by the abstraction of water for a public supply by means of future works; and the third was that districts whence water might be taken, and through which it might be conveyed by means of future works, should have a right to a share of the water upon terms to be agreed upon, or fixed by, the Local Government Board.

The EARL of VERULAM remarked that experience gained in Hertfordshire of the results of the depletion of local and private sources of water supply arising from the works of large water companies, led him to support the motion.

The EARL of LIVERPOOL said the Government had no objection to the Bill being read a second time on the understanding that it would be referred to a Committee of both Houses of Parliament, who would be able to consider the subject generally. The points at issue were of great importance, and it was hoped that the investigation of them by a Joint Committee would lead to some practical proposals being made with a view to putting matters on a satisfactory footing.

The Bill was then read the second time, and referred to a Joint Committee.

The following further progress has been made with Bills:—

Bill presented and read the first time: Aberdeen Corporation Water Bill.

Bills read a second time and committed: Havant Gas Bill, South Lincolnshire Water Bill.

Bills reported, with amendments: Gowerton Gas Bill, Southend Water Bill.

Bills read the third time and passed: Bishop's Stortford, Harlow, and Epping Gas and Electricity Bill, Farnham Gas and Electricity Bill, Wicklow Gas Bill.

After the "JOURNAL" had gone to press on Monday last week, it was announced that Lord Blyth had been proposed to the House as a member of the Select Committee on the Gas Companies Standard Burner Bills in place of Lord Joicey, and been accepted; and that Lord Ritchie of Dunfermline would be the Chairman of the Committee.

The Abertillery and District Water Board Bill and the Cambridge Water Bill have been referred to a Select Committee, consisting of the Earl of Kintore (Chairman), Lord Poltimore, Lord De Mauley, Lord Seaton, and Lord MacDonnell, to meet on Thursday, the 7th of April.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills brought from the Lords, read the first time, and referred to the Examiners: Bishop's Stortford, Harlow, and Epping Gas and Electricity Bill, Farnham Gas and Electricity Bill, Wicklow Gas Bill.

Bill read a second time and committed: Tipperary Gas Bill.

Bill reported, with amendments: East Grinstead Gas and Water Bill.

The Glasgow Gas Consolidation Bill and the Wishaw Burgh Extensions, &c., Bill have been referred to a Select Committee, consisting of Mr. Mooney (Chairman), Mr. Esslemont, Mr. Elverston, and Captain Tryon; to meet next Tuesday.

The Mallow Gas Bill, Mallow Urban District Gas Bill, Slough Water Bill, South Hants Water Bill, and Tipperary Gas Bill have been referred to a Select Committee, consisting of Mr. Armitage (Chairman), Major Willoughby, Mr. Scanlan, and Mr. Hodge; to meet on Wednesday, the 6th of April.

Last Tuesday, a petition was presented for an additional provision in connection with the Glasgow Gas Consolidation Bill; and it was referred to the Examiners. It had reference to the acquisition of the undertaking of the Baillieston Gas Company.

Last Tuesday, Mr. Norton-Griffiths (Wednesbury) asked the Chancellor of the Exchequer what would have been the revenue which would have been received from the export duty on coal, if it had not been taken off, during each of the past four years, and assuming that the export trade had not been affected by such duty. Mr. Hobhouse, replying to the question for Mr. Lloyd George, said that, under the conditions specified, the revenue that would have been derived from the export duty on coal during each of the four years, 1906 to 1909, inclusive, was estimated at £2,500,000, £3,150,000, £3,100,000, and £3,050,000.

EAST GRINSTEAD GAS AND WATER BILL.

House of Commons Committee.—Tuesday, March 22.

(*Before Mr.* ARTHUR STANLEY, *Chairman, Mr.* HAWORTH, *Mr.* GUINNESS, *and Mr.* M'LAREN.)

This is a Bill promoted by the East Grinstead Gas and Water Company for authorizing certain existing water-works and the construction of new water-works, the estimated cost of which would be £19,000.

The opposition came from Mr. James W. Larnach and others, and the Marriott Trustees, who were represented by Mr. RIGG, K.C.; Mr. ARTHUR H. HASTIE, who appeared in person; and Mr. COOPER, a landowner, who was represented by Mr. CUTHBERT BROWN. For the promoters, Mr. G. J. TALBOT, K.C., and Mr. CLODE appeared.

Mr. TALBOT, in opening, said the Company were incorporated under an Act of 1878, under which, among other things, they were empowered to buy land by agreement up to 5 acres. In 1892, further water was required; and the Company went to Parliament with a scheme, and works were authorized. When the matter came to be investigated, however, it was found that the supply would be a disappointment, and the works were not proceeded with. It was considered by the Company that, in cases where water companies had power to buy land by agreement, they acquired the ordinary landowner's right to take the water from under the land for the purpose of supplying their district. A suitable position was found at Hackenden; but the landowner would not sell part of the 113 acres, and the Company could only purchase 5 acres. The Chairman of the Company undertook to acquire the 113 acres, and let the Company have the part of the land which they wanted for water purposes for £1200. A well was sunk, and a 5-inch main was laid to the water-tower. There was a decision in the Courts with regard to the pumping of water from under land acquired by agreement; and the Company were acting *ultra vires*. One of the principal objects of the Bill was to legalize this supply. A main had been laid under a footpath which was the property of the Marriott Trustees, who brought an action against the Company to restrain them from laying the pipe there, because the water was from an unauthorized source. An injunction was granted; but ultimately the Marriott Trustees allowed the main to be laid under onerous conditions. Another main went into a roadway of which Mr. Hastie and his sister owned the subsoil; and an agreement was entered into in that case also. The Company were also asking for a new pumping-station at Forrest Row. The yield of the Hackenden well was 242,000 gallons per day. One of the chief points in the petition of Mr. Hastie was that he alleged that there was grave risk of the supply of water from the works proposed to be authorized being subjected to contamination and that stringent provision should be made to secure the purity of the water.

Mr. *W. V. Graham* gave evidence in support of the proposals in the Bill. He said that the new works would cost £19,000, and £3500 had been spent on filtration. The water supply now was good, sufficient, and permanent so far as it went.

Mr. RIGG, in addressing the Committee, contended that it would be a departure in Private Bill Legislation, in the case of a company of this kind coming to Parliament and asking that the agreement which had been entered into with them should be set aside.

Mr. TALBOT, in reply to the Chairman, said the points at issue were that, under the agreement, the pipes were removable after fifty years; that the use of the pipes was confined to certain water only; and that if the roads were broken up they must be repaired by the Company.

Mr. RIGG remarked that they would not press the point with regard to the use of the pipes for certain water only. He contended that where there were special circumstances there should be a variation of the Water-Works Clauses Act; and if the Company wished to lay mains through the Marriott Estate and along the footpaths, it should only be done with the consent of the owner.

Mr. TALBOT said that since the point with regard to the use of the pipes was not pressed, the promoters would consent to the agreement standing.

Mr. CUTHBERT BROWN then addressed the Committee on behalf of the estate of Mr. Cooper; and his contention with regard to the laying of mains was similar to that made by Mr. Rigg.

Mr. HASTIE'S case was that he had provided a water supply for his own property; and he asked the Committee to say that any powers given to the Company should not extend to his property.

The Committee found the preamble proved, and that the Bill should proceed subject to the insertion of a clause carrying out the Marriott Estate agreement, with the exception of the point which had been agreed.

LEGAL INTELLIGENCE.

PURCHASE VALUE OF THE HAMILTON (N.Z.) GAS-WORKS.

Question of Commercial or Structural Value.

The Judicial Committee of the Privy Council, consisting of Lord Macnaghten, Lord Atkinson, Lord Shaw of Dunfermline, and Sir Arthur Wilson, recently had before them an appeal from a decision of the Supreme Court of New Zealand on the question of the amount to be paid by the Corporation of Hamilton (N.Z.) for the undertaking of the Hamilton Gas Company, Limited.

In August, 1895, an Act was passed to authorize the Company to establish gas-works; and by section 46 the Corporation were entitled, at any time after the expiration of twelve years, to purchase the works and plant at a price to be determined by arbitration. The Arbitrators did not agree, and an Umpire was appointed; and he stated for the opinion of the Court the question whether the price should be determined on the basis of the commercial or the structural value. The Supreme Court decided that it should be the latter; and the Company appealed. At the close of the arguments, judgment was reserved; and it was given a few days ago.

Sir R. FINLAY, K.C., and Mr. ROWLATT (instructed by Messrs. Herbert Smith, Gass, King, and Gregory) appeared for the appellants; Mr. LEVETT, K.C., and Mr. NORTHCOTE (instructed by Messrs. Murray, Hutchins, Stirling, and Co.) represented the respondents.

Lord SHAW, in delivering their Lordships' judgment, said the judgment appealed from was pronounced upon a special case stated by Mr. Goldie, who, as Umpire in an arbitration between the parties, made alternative findings with reference to the interpretation to be placed upon the words "gas-works and plant," which were being taken over by the Hamilton Corporation from the Gas Company. The

alternative, upon which a very large difference of valuation depended, was thus stated in the special case:

At the hearing, the Gas Company contended that the price to be paid for the purchase of the gas-works and plant should be the commercial value thereof as a going concern, taking into consideration their present condition, rental value, earning power, and all surrounding circumstances, and not merely as on a sale of apparatus *in situ* and land and buildings; and that the Arbitrators and Umpire, in arriving at and determining such price, were entitled to capitalize the net annual profit or rental which, in their opinion, the Gas Company was, and might reasonably be expected to be, able and continue to earn and receive thereby and therefrom.

On the other hand, the position of the Borough Council was thus stated:

The Borough Council claimed that the price should be merely the value of the gas-works and plant regarded as gas-works and plant *in situ* capable of earning a profit, and that this value should be arrived at by taking the present value of the land and buildings and adding thereto what would be the present cost of the machinery and materials of a similar gas-works and plant and of placing such gas-works and plant *in situ* and making good the ground and deducting a sum for depreciation; or by taking the cost of the land, buildings, gas-works, and plant, and of laying down the gas-works and plant, making good the ground, and deducting a sum for depreciation.

Stated in the briefest terms, the controversy between the parties was accordingly whether the gas-works and plant should be treated as merely the material thing or as truly the undertaking for which that thing existed. The case depended not upon any rule or principle of law of general application, but solely on the just construction of the language regulating the measure and nature of the claim. It was argued that the Company had no monopoly or goodwill to dispose of, because they were liable to be bought out in twelve years. But circumstances might have so shaped themselves as to make it unwise for the Corporation to take over the gas supply, and the Company might have been left—and had the profit been small or dwindling, they probably would have been left—for an indefinite period undisturbed. While the position of the Company was measured by the language of the Statute, the Corporation had certain powers of acquisition under the Municipal Corporations Act of New Zealand, 1886. It was very plain that if the Corporation of Hamilton had attempted to exercise their general powers, under the Statute Law of New Zealand, for the acquisition of the gas-works, there could have been no doubt that they would have bought not only the works themselves, in the material sense, but all rights, powers, and privileges in connection with them; and that, on the other hand, so strong were those rights, powers, and privileges, that the Corporation were prohibited from establishing rival works in the same locality or any part thereof, except after obtaining the authority of the Legislature to do so by a Special Act. The Corporation were accordingly apprised of the wide scope of the term "gas-works," so far as the general law of New Zealand as to the acquisition of such works was concerned. On the other hand, the Company were apprised of the same fact; and, in these circumstances it appeared to their Lordships that, if a more limited signification of the term was to be introduced by the Company's Act of 1895, such limitation should have been plainly and easily made in language which would have excluded either monopoly, goodwill, or undertaking as such from being included within the term "gas-works and plant" employed. One limit to the profit-earning power of the undertaking appeared in the Act—viz., that the profits could never be declared at more than 15 per cent.; any balance over this figure being by anticipation drawn off for the benefit of the community in the reduction of the price of gas. All these matters were elements for consideration in ascertaining the price to be paid for the undertaking. In their Lordships' opinion, the decision of the Court below on the point submitted in the appeal was wrong; and they humbly advised His Majesty that the appeal should be allowed, and that the answer to the first question put by the Umpire in the special case should be that the price to be paid for the gas-works and plant of the appellants was £31,382. The respondents must pay the costs of the appeal.

CLAIM FOR WATER-RATE AGAINST A RECEIVER.

In the King's Bench Division of the High Court of Justice last Wednesday, Mr. Justice Channell delivered his considered judgment in an action brought by the Metropolitan Water Board (for whom Mr. Danckwerts, K.C., and Mr. A. B. Shaw appeared) against one Brooks, a receiver (represented by Mr. Horace Avory, K.C., and Mr. Giveen), who was sued for water-rate as an "owner by Statute" of certain flats in the East End. The facts are set forth in the judgment.

His Lordship said a Mr. Davies was owner of the flats, and he agreed with the East London Company for a supply of water to them by meter; the water to be conveyed through a pipe of larger dimensions than the Company were bound to use. Therefore the supply was entirely under the agreement, which provided for a minimum rate of payment and a rate per 1000 gallons of water supplied in excess. The agreement had never been determined, and the supply had continued practically on the terms contained in it. Davies got into arrears with his payments; and when there were substantial arrears, his mortgagees, the Norwich Union Insurance Company, took possession of the premises, and appointed defendant Brooks receiver of the rents. The question arose whether Brooks was personally liable for the arrears of water-rate. It was quite clear that he could not be liable at common law on the agreement with Mr. Davies, and he was not liable unless the Statutes set forth to the contrary. He (his Lordship) therefore had to consider the Statutes. The plaintiffs said that, under the various Statutes dealing with water companies, the defendant was liable, because, as receiving the rents of the tenements for the persons interested, he must, for the purpose of the water-rates, be deemed to be the owner of such tenements. This was a convenient remedy given to water companies in case of tenements where it might be difficult to find the real owners; and it was also intended for the relief of occupiers who were not in default. The question was whether Brooks was to be deemed to be the owner under the 81st section of the East London Water Act; and, looking at the purpose for which the Act was passed, the point was whether the owner there did not necessarily mean the real owner, who had the property charged with the water-rate, or whether it could be applied to a mere constructive owner, such as Mr. Brooks, as receiver and manager. In his opinion, it could not be so applied; and a merely constructive owner such as a receiver and manager could not be made liable for arrears of water-rate. Water-rates were a charge on the property; whereas here it was sought to make Brooks personally liable. He was not the owner under the Act, because he received the rents for the Norwich Union Insurance Company. Upon these grounds, he thought the claim failed. The plaintiffs asked also for a declaration that the rates were a charge on the property; and this was the case. He could not, however, make such a declaration against the defendant, who was a mere manager or agent, in the absence of the real owners of the property as parties to the action. The action therefore failed; and judgment must be for the defendant, with costs.

Embezzlement by a Gas Manager.

Before the West Riding Magistrates at Doncaster last Tuesday, Walter Blinco, Gas Manager, was charged with embezzling £72 17s. 6d. belonging to the Conisborough Gas Company. In opening the case for the prosecution, Mr. J. L. Turner said prisoner's duties as Manager of the Conisborough Gas-Works included seeing to the collection of money in the slot-meters. Prisoner had been in the service of the Company for five years; and his duties were all satisfactorily performed until recently, except that upon one occasion he was censured for being the worse for drink. Between Dec. 31 and the day of the arrest, Charles Oswald, the collector, paid over £374 17s. 6d., and received receipts up to the amount of £370 19s. 2d. About the middle of January, the Secretary of the Company (Mr. A. E. Rands), wishing to make up his books, wrote to prisoner asking him how much had been collected for the last quarter; and he replied £370 19s. 6d. He also stated that he had paid £300 worth of copper into the Sheffield Bank; and he would pay the remaining £70 odd in at the Mexborough branch during the week. Prisoner did not hand in the balance of the money; and the Secretary wrote to him again, when he replied that he had been very busy. Ultimately, the Secretary reported the matter to the Chairman of the Company (Mr. C. Kilner), who went to the office the same day. Prisoner did not account for the balance; and Mr. Kilner went out to seek legal advice. When he returned, prisoner had gone and left his key. An examination of the safe disclosed the fact that there was £72 17s. 6d. short. Later prisoner delivered himself up to the police at the Conisborough Railway Station, after sending word that he would be there. Prisoner pleaded guilty, and said: "I hope you will take into consideration my previous good character. Until a year-and-a-half ago, I was a teetotaler, from 1885. Only bad company, drink, and gambling have brought me into this to-day. I have a family of little children." Prisoner was sentenced to three months' imprisonment.

Metropolitan Water Board and Farming Agreements.

The case of the *Metropolitan Water Board v. Cannon*, which came before his Honour Judge Woodfall, in the Westminster County Court early this month, on a reference back to him from the King's Bench Division, as reported in the "JOURNAL" for Nov. 2 last, was decided a few days ago. It was a claim against the occupier of a flat at Brixton for water-rate which he said he had paid in his rent. The occupants of the flats in question paid inclusive rents, and under a farming agreement the landlord was to pay all rates. Having received demands for water-rates, they consulted Mr. George Kebbell, with the result that it was agreed to make a test case of the claim against Mr. Cannon. Mr. A. B. Shaw, for the Water Board, cited the Water-Works Clauses Act and the Board's Charges Act in support of his contention that the consumer was liable. Mr. Giveen appeared for the defendant. His Honour had previously held that the consumer was liable, and he said a second trial of the case had not altered his opinion. He could not understand why the case had been sent back to him. It was a question of law, and he must assume that the Divisional Court considered he was wrong; but the Court took a strong view because, he was told, an unauthenticated note of his judgment was taken, and plaintiffs' Counsel was practically never heard. He must give effect to his decision, and enter judgment for the defendant, with costs. Mr. Shaw asked leave to appeal; but his Honour refused it.

Maintenance of Water-Supply Pipes.

The disputed liability for maintaining water-pipes from mains to residences has been productive of two days' litigation in the County Court at Portsmouth, where, on Monday last week, the Portsmouth Water Company obtained a reverse judgment at the hands of his Honour Judge Gye. The action was brought by Mr. Thomas Parnell, who claimed 10s. 8d. for repairing a pipe between the main and his house; the Company having threatened to cut off the water in consequence of leakage. Mr. Payne contended for the plaintiff that his client had no power to break up the public road, and, moreover, the Company had placed a tap outside each house in the borough, which showed that tenants were liable only for pipes under their own roofs. Mr. Cababé maintained the view that all the repairs from the mains devolved upon consumers. His Honour, in the course of a lengthy judgment, complained of the indecisive wording of the Act of Parliament, but, owing to the Company's threat to cut off the water, he decided in favour of the plaintiff, with costs. In view, however, of a possible appeal by the Company, execution was stayed for a month.

The Annual National Trades and Industrial Exhibition was opened on Monday of last week at Bingley Hall, Birmingham. Almost every trade and manufacture is represented; the present show being the largest of the series. Among the gas exhibits, the Corporation Gas Department illustrate four recent systems of high-pressure lighting.

MISCELLANEOUS NEWS.

BOLLINGTON GAS-WORKS IMPROVEMENTS.

Local Government Board Inquiry.

Last Wednesday, an inquiry was held at the offices of the Bollington Urban District Council, by Mr. R. C. MAXWELL, K.C., respecting an application made by the Council to the Local Government Board for a Provisional Order to partially repeal, alter, or amend the Bollington Improvement and Lighting Act, 1862, so as to remove the limitation of the amount of the general district rates levied in any one year; to enable the Council to purchase by agreement a plot of land adjoining their gas-works; to provide for reducing the illuminating power of the gas; to enable the Council to borrow, with the sanction of the Board, further moneys for the purposes of their gas undertaking; to remove any doubt as to the validity of the outstanding loans of the Council for the purposes of that undertaking; and for other purposes. The total amount required for the gas undertaking was £27,859; but £17,000 of it has already been borrowed, and of this loan the Board have sanctioned £15,000. The present application, therefore, was for authority to borrow a further £10,000, and to obtain the sanction of the Board to the balance of the £17,000 not already sanctioned (£2859).

Mr. SAMUEL KNIGHT, the Clerk to the Council, explained that they asked permission to insert a clause in the Provisional Order allowing them to supply gas of 16 instead of 18 candle power. The Council considered they were justified in asking for such a reduction, inasmuch as out of 697 local authorities and companies supplying gas, only nine, including Bollington, were required to supply gas of 18-candle power or more. Of 24 local authorities and companies in Cheshire supplying gas, only two—Bollington and Wilmslow—were required to send it out of 18-candle power; in six cases it was to be of 16-candle power; in eight, of 15-candle; in seven, of 14-candle power; and one (Stockport) was not required to supply at any fixed standard. Taking England and Wales as a whole, there were five local authorities and four companies supplying gas of 18-candle power, 25 local authorities and 20 companies supplying 16-candle gas, 83 local authorities and 179 companies supplying 15-candle, 94 local authorities and 261 companies supplying 14-candle, and 16 local authorities and 20 companies were not required to supply at any fixed standard. From these particulars it would be seen that the greater portion of the local authorities and companies were only called upon to supply gas of 16-candle power or less; the numbers being 653 out of 697. The Council considered they were not asking for any unreasonable reduction. Gas was used almost universally with incandescent burners and for cooking; there being in Bollington more than 700 stoves out on hire. It was generally admitted in the gas industry that the lower the candle power of the gas, the better suited it was for both incandescent lighting and cooking.

Mr. *William Rogerson*, the Gas Manager to the Council, said that from a canvass of 900 houses in Bollington it had been shown that 230 were using incandescent burners entirely, 597 used them partially, and 73 used flat-flame burners. There were about 200 houses that had not been canvassed, as they were just outside the district. He thought that if they could adopt a lower candle power for the gas it would be more beneficial to about 90 per cent. of the present consumers, for the manufacture would be cheaper, and consequently the price would be lower. They had accommodation for the purification of gas by oxide of iron; but they still used lime. If they used oxide instead of lime, it would effect an economy of fully 40 per cent. in purification. At present, owing to the unnecessarily high standard, they could not take advantage of the more up-to-date method.

Mr. *William Newbigging*, the Engineer and Manager of the Macclesfield Gas-Works, said he quite agreed with the evidence given by Mr. Rogerson. The Council were taking a step which had been approved by Parliament. They had not gone so far as the authorities would allow; but he thought they were acting judiciously. At the same time, he was opposed to gas of very low illuminating power—as low as 14 candles. In making the application, the Council had not said anything about the kind of burner to be employed; but he took it they would use the most up-to-date one.

Mr. *Rogerson* said in 90 per cent. of the houses the occupants would feel the benefit of the lower candle power. In answer to a question by the Inspector as to the method of testing the gas, he said the Council had under consideration the purchase of more modern apparatus; and he thought personally that the standard adopted should be the "Metropolitan" burner No. 2, as this would tend to uniformity in methods of testing.

Mr. T. DAVIES said he did not wish to raise any objection to the application, but he would like to ask if the people who used flat-flame burners would have the same illuminating power with 16-candle gas as with the 18-candle gas. He thought it would be much less.

Mr. *Newbigging* said the question was a very sensible one; but he could answer it in this way: The flat-flame burner people would suffer if the Model Clauses were put on the Council in their entirety; but if the application of the Council were allowed to reduce the power, he did not think they would suffer at all—in fact, he was quite sure they would not.

Mr. KNIGHT said the Council also asked permission to purchase a plot of land near the works for purposes incidental to the manufacture of gas, as at present they could not purchase under the powers of their Act. The land was 1532 square yards in extent. Part of it consisted of a long strip between the works and the Railway Company's road to the goods station; and the Council hoped to construct shoots over the strip into their coal-shed. It was expected that the saving thereby effected would amount to at least £30 per annum. The Council had entered into a provisional agreement with the owner of the land for the purchase of it. Since 1905, the general district rate had been at its limit; and notwithstanding this there had been a deficiency—in 1906 of £98, in 1907 of £403, in 1908 of £287, in 1909 of £353, and he was expecting one of about £250 this year. In 1906, the gas profits were drawn upon to the extent of £100, in 1907 of £250, in 1908 of £150, in 1909 of £335, and this year, up to the present, they had drawn £100. Unfortunately for the district, the assessable value compared with the population was very low, as the majority were working-class people. With reference to the outstanding loans of the Council, of £17,959 borrowed up to date, only £6162 remained owing, and towards this £1946 had been invested in Consols at March 31 last year, and a further £139 had just been paid into the sinking fund. On going through the last Board of Trade returns, he found that the average capital outstanding—amounts in sinking funds being taken into consideration—worked out at 8s. 7d. per 1000 cubic feet of gas made for the whole of England and Wales, while for Bollington itself it was only 2s. 6d. Local authorities making about the same quantity of gas as the Bollington Council were allowed to raise considerably over £27,859, which would cover the amount now applied for, together with that already actually raised. The Council proposed to use the additional money for reconstructing the existing plant, mains, &c., for laying new mains and services, for providing more carbonizing plant and storage, and for the purchase of land for coal-shoots, &c. The Council were prepared to accept such provisions as appeared necessary to ensure the repayment of the money borrowed.

Mr. *F. F. Grafton*, the Chairman of the Council, said they had not made the application with any desire of increasing the rates, but they realized that they were getting in a very dangerous position.

Mr. *Newbigging* said the capital applied for was very reasonable indeed. They would really have been justified in asking for more; but perhaps they were not quite so sanguine as he was as to the increased trade in the future.

The INSPECTOR said the Council's case had been very well put, and Mr. Knight had given in a very able manner all the information he could. They were indebted also to Mr. Newbigging and Mr. Rogerson for their valuable evidence.

As there was no opposition, the inquiry closed.

PROPOSED GAS-WORKS FOR WARSOP.

Local Government Board Inquiry.

A Local Government Board inquiry extending over two days has been held at Warsop by Major C. E. Norton, regarding an application by the Urban District Council for a Provisional Order authorizing them to borrow £10,000 for the construction of gas-works. The inquiry was largely attended, and considerable opposition was offered. The Council were represented by Mr. C. C. Hutchinson. Mr. L. Macassey opposed on behalf of the Staveley Coal and Iron Company; Mr. R. S. Clease for the Shirebrook and District Gas Company; and Mr. W. H. Mole for the Great Central Railway Company. We hope next week to publish a fuller report of the proceedings than is possible now.

Mr. HUTCHINSON, in opening, explained that under the Mansfield Corporation Act in 1901, with or without the consent of the Warsop authority, the Mansfield Corporation could have supplied the whole district with gas; but eventually a price of £300 was agreed upon between the Mansfield Corporation and the Warsop authority for the purchase of the right to do so. The Inspector would learn from the objections of a Company that part of the district in question already came within the scope of their profitable operations. In 1899, some promoters entered into a bargain with the Mansfield Corporation, and purchased for £500 such rights and privileges as the Corporation had not then exercised for Warsop Vale, which comprised a small portion of the population of the parish of Warsop, amounting to not more than one-sixth of the whole. Strictly speaking, if the matter were brought before a Parliamentary Committee, probably the Company, having no interest in the parish of Warsop, for which the Urban Council sought their own legal rights, would not be heard. The matter was one entirely of domestic economy. It was intended to spend about £8000; leaving £2000 in reserve for anything that might arise. It was estimated by men of experience that gas could be supplied at 3s. 4d. to 3s. 6d. per 1000 cubic feet.

Mr. CLEASE submitted that the Mansfield Corporation, having obtained statutory rights for the supply of gas, could not legally sell such rights to another authority.

Mr. MACASSEY argued that the Staveley Company paid 65 per cent. of the total rates of the parish; while practically the whole of their property was situated within the area of supply of the Shirebrook Company, so that they would not benefit by the new gas-works.

Mr. MOLE said that all the Great Central Railway Company required was protection for their railway where it was thought the undertaking might interfere with the Company's works—such as at level crossings. The Company associated themselves with the opposition of the Staveley Company; their interests being of a similar character, but in a less degree.

Mr. *Arthur Graham*, Gas Engineer to the Mansfield Corporation and Engineer of the proposed scheme, said he considered that gas could be supplied at 3s. 6d. per 1000 cubic feet to the ordinary consumers, and 4s. 2d. for slot-meters. He calculated the total consumption at 6⅜ million cubic feet, exclusive of public lighting. The estimated expenditure was £840, and the receipts £1620—leaving a gross profit of £780; and after the payment of interest and sinking fund charges, there would be a profit of £600.

Mr. *Corbet Woodall*, Consulting Engineer to the Shirebrook Gas Company, said he did not think it would be to the advantage of Warsop ratepayers to be supplied with gas by the Council. He did not wish to speak disrespectfully of the advice which had been given to the Council, but he was sure they were wrong to contemplate the undertaking proposed.

Mr. *R. G. Shadbolt*, Engineer to the Grantham Gas Company, said gas, from works such as were proposed, could, he thought, be supplied at 3s. 4d. per 1000 cubic feet. He based this opinion upon his experience of similar small undertakings which were operated at a profit after the first two years' working. After allowing for interest and sinking fund, he estimated a profit of something like £137 per year on

the sale of gas supplied at 3s. 4d. per 1000 feet to ordinary consumers, and 4s. 2d. to slot consumers. The Council would be well advised in gaining possession of the gas supply of the district.

Mr. *Sleight*, a schoolmaster, gave evidence that the supply of gas to Warsop Vale by the Shirebrook Company was unsatisfactory; and Mr. *Renshaw* made a similar statement respecting the street lighting.

Mr. *J. N. Derbyshire*, the Chairman of the Shirebrook Gas Company, stated that his Company were able and willing to give a supply of gas to Warsop, as soon as they had power to do so, at the same price as they were at present charging in their district. He believed his Company could supply gas at a cheaper rate than the Council.

After the Inspector had been addressed on behalf of the various parties, the inquiry closed.

IPSWICH AND THE STANDARD BURNER BILL.

An Agreement Arrived at.

At a Meeting of the Ipswich Town Council last Wednesday—the MAYOR (Mr. A. Gibb) in the chair—the Paving and Lighting Committee further reported as follows regarding the Gas Companies' Standard Burner (No. 3) Bill.

> At the meeting of the Council held on Feb. 9 last, the Bill was referred to the Committee for consideration; and they were also empowered, if they thought desirable, to affix the common seal to a petition against the Bill, and to take all necessary steps to effectively oppose it. There were seventeen gas companies promoting the Bill, with the object of having the burner known as the "Metropolitan" argand burner No. 2 substituted for the burner described in the Acts and Orders relating to their respective undertakings, for the purpose of testing the gas supplied by them. Under the Ipswich Gas Acts, the Ipswich Gaslight Company were at present under obligation to supply gas of an illuminating power of 15 candles, when tested with a burner known as Sugg's "London" argand burner No. 1. The Committee were advised that the effect of substituting the new standard burner defined in the Bill for the Sugg "London" argand burner No. 1 would be to enable the Company to supply as 15-candle gas, gas which, tested by the present testing-burner, would be only 14 candles. The Bill did not offer any *quid pro quo* or compensation to the Corporation or general public in return for this reduction of illuminating power, though the effect of the change would be to enable the Company either to obtain a larger quantity of saleable gas from each ton of coal, or to save the expense of the enrichment of the gas. The Committee accordingly prepared a petition against the Bill; and the same was duly lodged on the 18th ult., and the Committee agreed with other local authorities affected by the Bill that joint action should be taken in the opposition. The Committee had no desire to oppose the Bill, provided the interests of the public were properly protected, and a reasonable concession was made by the Company in return for the undoubted pecuniary gain which would accrue to them. Negotiations were accordingly opened with the Directors, after the petition was lodged; and the Committee were happy to report that the Company had now agreed definitely to reduce the price of gas 1d. per 1000 cubic feet after Dec. 31 next, if the Corporation withdrew their opposition and the Bill became law. The Committee considered this a fair arrangement; and they had therefore withdrawn their petition, and asked that their action be approved and confirmed.

Mr. PIPE said that, after the last meeting of the Council, the Committee entered into negotiations with the Gas Company. While the latter were not prepared to withdraw their Bill, they were ready to reduce the price of gas 1d. per 1000 feet. In view of this concession, the Committee thought it wise to withdraw their opposition to the Bill. He moved the adoption of the report.

Alderman GRIMWADE: Will it mean a reduction of a penny to all consumers?

Mr. PIPE: Yes.

Mr. E. P. RIDLEY said it seemed to him that this was a matter which did not redound to the credit of the persons who had been dealing with it. At the last meeting of the Council, it was said that the Ipswich Gas Company would, by the Bill, be able to supply gas of a quality inferior to the present, and to the prejudice of the consumers. Other objections to the Bill were also mentioned—such as the facilities provided for testing. These points were all of some importance; but instead of dealing with them, they were content with a miserable 1d. reduction—a 3 per cent. reduction on the price of gas. If this was the whole object in view when the Committee advised that the matter should be dealt with by a petition against the Bill, he thought it unworthy of the Corporation to take such a course. They could not say how long the reduction in the price of gas would continue, and the probability was that, apart from their action, the price would have been reduced.

Mr. J. B. CULLINGHAM inquired whether the Gas Company would pay the costs which the Corporation had incurred so far, and what they amounted to.

Mr. PIPE replied that they would not exceed £30; and he pointed out that the 1d. reduction would make £1800 difference to the consumers, which was a substantial concession. It was the general opinion of the Committee that, though they might have spent a considerable sum of money in fighting the Bill, the probability was that they would not have been successful.

Mr. J. R. STADDON did not think they were protecting the public sufficiently from the power the Gas Company were trying to get in order to give them an inferior quality of gas.

Miss COULCHER inquired whether the light in the side streets would be lessened by the difference in the gas.

Mr. PIPE replied that the Bill proposed to lower the illuminating power of the gas; but street lighting would not be affected, as incandescent burners were used. They did not require gas of a high illuminating power, but heat. Many private consumers used the same class of burners, and would be in the same position. He believed that most of the other companies were negotiating for certain concessions.

The report was adopted with three dissentients.

BRITISH GAS LIGHT COMPANY, LIMITED.

Revival of the Bonus.

The Ordinary Half-Yearly Meeting of the Company was held last Wednesday, at the London Offices, No. 11, George Yard, Lombard Street, E.C.—Mr. J. HORSLEY PALMER in the chair.

The SECRETARY (Mr. A. W. Brookes) read the notice convening the meeting, and afterwards the Directors' report and, in compliance with the Act, the Norwich accounts. The former was as follows:—

The Directors submit the half-yearly accounts of the Company to Dec. 31 last, as examined and certified by the Auditors, who have also vouched for the correctness of the several investments held by the Company.

The available profit is £31,622, after deducting (omitting shillings and pence) the following sums: Income-tax, £2146; Hull debenture interest, £2118; Norwich debenture interest, £1779; Potteries debenture interest, £659; Trowbridge debenture interest, £164; and interest on Debenture Stock, £2260—£9128.

HULL.—The gas-rental shows an increase of £1007, as compared with that of the corresponding period of 1908; the price of gas having been the same—viz., 2s. per 1000 cubic feet. Coke exhibits a decrease of £1421; tar and tar distilling an increase of £200; and ammoniacal liquor and sulphate of ammonia a decrease of £396. Coals have cost 13s. per ton, as against 14s. 3d. Coke has realized 10s. 6d. per ton, as against 11s. 4d. The gas sold was 638,903,202 cubic feet, against 627,842,142 cubic feet in the corresponding period of 1908—an increase of 11,061,060 cubic feet, equal to 1·76 per cent. Of this quantity 43,535,000 cubic feet was supplied in bulk to the Corporation for the supply of the old Town; being a slight reduction, as compared with the quantity supplied in the same period of 1908. The profit realized is £6007 in excess of the parliamentary interest. This sum has been invested, making the reserve fund £43,565.

NORWICH.—The gas-rental shows a decrease of £1544; the price of gas having been 3s. per 1000 cubic feet, as against 3s. 3d. for the corresponding period of 1908. Coke shows a decrease of £150; and tar and ammoniacal liquor an increase of £435. Coals have cost 16s. 1d. per ton, against 17s. 8d. Coke has realized 14s. 6d. per ton, against 15s. 8d. The gas sold was 262,585,900 cubic feet, as against 250,983,900 cubic feet—an increase of 11,602,000 cubic feet, or equal to 4·62 per cent. The profit realized is £2438 in excess of the parliamentary interest.

POTTERIES.—The gas-rental shows a decrease of £554, as compared with that of the corresponding period of 1908; the price of gas having been the same—viz., 2s. 6d. per 1000 cubic feet. The decrease is principally attributable to the granting of further rebates to large consumers from Oct. 1 last. Coke shows a decrease of £59; tar an increase of £306; and ammoniacal liquor and sulphate of ammonia an increase of £10. Coals have cost 10s. 5d. per ton, as against 11s. Coke has realized 8s. 6d., as against 8s. 5d. per ton. The gas sold was 176,403,563 cubic feet, as against 176,395,877 cubic feet—an increase of 7686 cubic feet. The profit realized, after writing off £1000 on account of plant thrown out of use, is £1420 less than the parliamentary interest. This sum will be taken from the reserve fund, leaving a balance of £1648 to the credit of that account.

TROWBRIDGE.—The gas-rental shows an increase of £115, as compared with that of the corresponding period of 1908; the price of gas having been the same—viz., 3s. per 1000 cubic feet, with discounts. Residual products show an increase of £145. Coals have cost 16s. 3d. per ton, against 17s. per ton. Coke has realized 11s. 11d., against 12s. 3d. per ton. The gas sold was 37,446,130 cubic feet, against 36,712,676 cubic feet—an increase of 733,454 cubic feet, or equal to 2 per cent. The profit realized is £267 in excess of the parliamentary interest.

HOLYWELL.—The gas-rental shows a decrease of £12; and residual products a decrease of £3. The profit realized is £441.

The available profit added to the previous balance of profit and loss amounts to £85,333. From this sum, the Directors recommend a dividend at the rate of 10 per cent. per annum, with a bonus of 2s. 6d. per share, both free of income-tax. The dividend and bonus will amount to £27,562, and leave a balance of £57,771.

The CHAIRMAN, in moving the adoption of the report and accounts, said he hoped the former had given as much pleasure to the shareholders as it had to the Directors in drawing it out; for although they could not show on this occasion any very large increase in the gas business, still they were able to give the shareholders a very satisfactory account of the works, and of the business generally at the different stations, as well as of the profits earned, which had made a slight increase in the dividend possible. The half year under review might be called one of small events—that was, they had not been doing any vast work, nor had they made any great increase in the business. It had been rather a period of marking-time. It would be recognized that the state of the country during the last six months had been such—upset as it had been by a General Election and varying financial difficulties—that it was not likely that an industrial Company of this nature, depending so much upon good trade, and the peace of the trade of the country, would show anything more than what he had called "marking-time." If the shareholders had followed the report, they would have noticed that at Hull (which was by far the largest station, and a very important industrial centre), the amount of gas which the Company supplied wholesale to the Corporation for the supply to the old town, had shown a decrease; and in the Company's own district, which embraced the larger portion of the outer city, they had only had an increase of 1¾ per cent. This was not what they would naturally expect from a place of the position and magnitude of Hull. But as it was, they must accept it so. At Norwich, probably owing to the reduction in the price of gas by 3d. per 1000 cubic feet, they were able to report that they had an increase of 4·62 per cent. That was much better; and he thought this was due in a great measure to the energetic management of Mr. Thomas Glover, who presided over the Company's business in that town. The 3d. reduction at Norwich represented a cost to the Company of £2800; but they had sold an increased quantity of gas yielding £1300, so that the actual decrease in rental was only £1500. He hoped and believed the able management there, and the pushing of the sale of gas would, in a short space of time, pick up this rental, and more. Turning to a few details in connection with the business, he reported six months ago that the Company had acquired certain premises immediately adjoining the Hull offices and workshops; and they were now able to report that the extensions and additions which were urgently required there were approaching

completion. The Company would then have a complete set of both offices and workshops, in a central position, and in close proximity to the very handsome show-room the Company rented from the Corporation in one of the principal parts of the city. There was one little piece of information he might give the shareholders with regard to the shop which they had rented for the last five years. The lease was coming to an end; and the Corporation were so pleased with the Gas Company as tenants that they had granted them seven additional years at the same rent. This showed that the Company were on good terms with the Municipality. As to the works at Hull, there were two gasholders of considerable age. They were requiring a little additional storage there; and as one of the holders had been in service for a period of 35 years, and the other for 44 years, it was decided to replace the larger one with a spiral-guided holder of increased capacity. This was now in course of erection, and would, he believed, be a valuable addition to the property of the Company at Hull; the cost being only £5345. They were also constructing at Norwich, to meet the increasing business, a new tank and holder. He mentioned this at the last meeting. The work was now well in hand—the tank, in fact, was almost finished. They were going to put up a spiral-guided holder, and the cost of it, when completed, would be about £13,000. The new works at the Potteries station which, as the shareholders knew, had been in course of construction on a new site, were, practically speaking, finished. They had still a balance of £12,000 to wipe off. This must be done gradually, as the business could afford it. The reserve there had been reduced to a very small amount; but they sincerely hoped trade would revive in the district before very long, so that the business might warrant the writing-off of the amount in suspense. Some of the shareholders might remark that the business of the Potteries was not quite so profitable as it ought to be. They had to meet severe competition there in the way of electric light; and they had also some large consumers who required special discounts, and, to retain them, they had had to practically reduce the price by granting the discounts. There had also been a small reduction in the charge for public lighting. That was briefly the work they had gone through during the half year. There was one other matter. They were, in conjunction with a great many other gas companies, promoting the Standard Burner Bill for their Potteries, Trowbridge, and Holywell stations. There were no petitions against the Bill so far as the Company were concerned, though, of course, as it was a joint Bill, they would have to stand the racket of the petitions put forward by other towns. He should imagine, however, that Parliament would grant the standard burner, as it had been granted in so many cases, and was now almost universally used in the great towns, and entirely so in the Metropolis. He was glad to be able to report improvement in the prices of sulphate of ammonia and tar products; so that the prospect was rather better than it had been during the past year. Just one word about the bonus. The Directors were exceedingly glad to be able to recommend it. It was just twelve years since they last distributed a bonus; and he foreshadowed in his remarks a year ago that the Board hoped very shortly to be in a position to give one. He did not intend to prophesy with regard to future bonuses. Of course, it would be wrong on his part to attempt to indicate what the future would bring forth; but they would certainly on future occasions, if all went well and rightly, hope to continue the bonus in the same regular way that they did a good many years ago. This was all he had to say that day, because the small amount of increase in capital at the various stations, and the additions to the meters placed, service-pipes laid, and lamps fixed were all very much what had been regularly done for many past half years; and there was just a steady increase in the consumption of gas and in the consumers.

Mr. Frederick Wilkin seconded the motion, which was unanimously carried.

On the proposition of the Chairman, seconded by Mr. Corbet Woodall, a dividend at the rate of 20s. per share and a bonus of 2s. 6d. per share, clear of income-tax, was declared.

Major-General W. T. Corrie proposed a vote of thanks to the Secretary and the officers of the Company; for (he remarked) without their able assistance, the Board would not be able to work so satisfactorily for the Company. The Board were delighted with the services of Mr. Brookes; and the officers at the stations were so good at their work that, when the Directors made their periodical visits to them, they came back with great pleasure, feeling that they could report to the shareholders that the officers at the stations were always doing their duty and their very best in the interests of the Company.

Mr. Leonard R. Wilkinson seconded the proposal, which was cordially carried.

The Secretary, in acknowledging the vote, said he should convey it to the officers at the various stations, to whom it would be an incentive to further effort and also a source of much gratification.

Mr. Kenneth R. Mackay moved a vote of thanks to the Chairman and Directors, congratulating them on the results at the different stations. He added that, as shareholders, they were pleased to get the bonus, partly because it added extra value to their shares.

Mr. Louis Penny seconded the motion; and it was at once heartily agreed to.

The Chairman, in responding for himself and his colleagues, observed that the Board sincerely hoped they would be able to present to the shareholders six months hence a report equal to the one they had presented that day.

Barnard Castle Gas Company.—The 76th annual meeting of the Company was held last Tuesday. The Chairman (Mr. R. T. Richardson) pointed out the main features of the year's accounts, which showed a profit of £1298, and a balance in hand, subject to dividend, of £1525. The dividend recommended (5 per cent. per annum) was declared. The Directors' fees were increased to 50 guineas; and the Secretary (Mr. Robert Wood) received an increase of salary. The Chairman stated that it was proposed to reduce the price of gas by 2d. per 1000 cubic feet; and he also mentioned that a new exhauster plant was being obtained, and every effort made to improve the quality of the gas, which he acknowledged had not been all that could be desired during the past six months.

OTTOMAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held on Tuesday last, at the London Offices, No. 9, Queen Street Place, E.C., under the chairmanship of Mr. Stephenson R. Clarke.

The Secretary (Mr. Thomas Guyatt) read the notice convening the meeting and the certificate of the Auditors; and the report (which was noticed in last week's "Journal," p. 831) and the statement of accounts were taken as read.

The Chairman remarked that he had received a letter from Colonel Le Geyt Daniell expressing regret at being unable to meet the shareholders that day. It was, however, a pleasure to be able to say that the Colonel was better for his stay abroad, and hoped soon to return to this country. The proprietors would see, on turning to the balance-sheet, that this half year there was one great difference as compared with that for the six months to June 30 last. An amount of £16,000 of debentures, which were the unredeemed balance of the issue of £25,000, had now been redeemed, and had disappeared from the accounts. This redemption of the debentures caused the amortisement and reserve accounts, which now amounted to £43,600, to be apparently very unequally balanced by investments, totalling only £3931. But to the latter figure must be added this sum of £25,000 of debentures redeemed, and the balance of the account was employed in the business. On the other side, there was a considerable increase in the amount owing to the Company. This was principally because of the sum due from the Municipality for public lighting. There had been, unfortunately, since the *regime* was changed in Turkey, a tendency, both on behalf of private individuals, and especially of public bodies, to postpone the settlement of accounts. He said "unfortunately," as it undoubtedly tended to check the feeling of sympathy which Englishmen felt with the desire of the Turks for a more liberal system of Government. However, he was pleased to say that the Directors had that morning received better news; and the debt was now largely reduced. With regard to the revenue account, increasing business had compelled the Company to carbonize 300 tons more coal; but in spite of this, the outlay had been on the half year £80 less—the average cost showing a reduction of just over 1s. per ton. The make of gas per ton was 10,787 cubic feet; and they had sold 9840 cubic feet—an increase of 220 cubic feet per ton. Stocks had been well written-down, and the fitting department had been very busy, which he thought they might take as a sign that at present there was no symptom of a decline in the Company's business. He concluded by moving the adoption of the report and accounts.

Mr. H. Ward Andrews seconded the motion; and it was, without further comment, carried unanimously.

The Chairman proposed the payment of a dividend for the half year at the rate of 7 per cent. per annum, less income-tax, on the preference shares, and of 8 per cent. per annum, tax free, on the ordinary shares.

Mr. A. M. Paddon seconded this; and it was agreed to.

The retiring Directors (Colonel Daniell and Mr. Andrews) were then re-elected, on the proposition of the Chairman, seconded by Mr. Paddon; and the Auditors (Messrs. T. H. Cooke and A. W. Cooper) were likewise re-appointed, on the motion of Mr. Collingwood, seconded by Mr. W. T. Clarke.

The Chairman proposed a vote of thanks to the Engineer and Manager (Mr. John Gandon) and the Secretary. A foreign company, he remarked, needed the closest possible attention and the hardest work from its officers; and the Ottoman Company had this, both at Smyrna and in London.

Mr. Paddon, in seconding, said that, by reason of the recent changes in Turkey, the conditions had grown no easier; and yet the officers were as successful as they had been in the past in maintaining the position of the undertaking. He did not think any similar company could have a better outlook than theirs; but this would always be governed by the zeal and assiduity which the officers brought to bear upon their work.

The vote was heartily accorded, and acknowledged by Mr. Guyatt.

Mr. A. F. Phillips (the Company's Consulting Engineer) proposed a vote of thanks to the Chairman and Directors. It was, he said, due to the ability they showed and the efficiency of the control they exercised, that the Company had attained its present prosperity. He did not think any Board of Directors could more fully realize than did that of the Ottoman Gas Company the absolute necessity in the case of a foreign undertaking of keeping down the expenditure and preparing for the time when their contract would expire. It was only those foreign companies who had written-down their capital that could be assured of continued prosperity. He knew from experience that this was the great aim of the Directors of the Ottoman Company. While the consumption grew, they took care that the capital did not follow.

Mr. Daun seconded the proposal, which was cordially agreed to.

The Chairman, in acknowledgment, remarked that it was a great pleasure to have one's policy commended by anyone of such enormous experience as Mr. Phillips.

PROGRESS OF COALITE LIMITED.

The Adjourned Ordinary General Meeting of the above-named Company was held at Salisbury House, E.C., last Wednesday—Mr. J. H. Smith in the chair.

The Chairman, in moving the adoption of the report and accounts for the year ended Dec. 31 last, said they represented the financial position of the Company at the end of three-and-a-half years; and the total excess of expenditure over receipts had amounted to only £7007. When the large amount of liability to the British Coalite Company that had been paid off during this period—altogether some £165,000—was taken into consideration, as well as the loss on the realization of their British Coalite shares, he thought it must be admitted that this result was by no means unsatisfactory. At the meeting in December, 1908, the shareholders were informed that patents had been secured in 33 countries, including the chief countries of Europe, America, and the Colonies. Since then patents had been granted in Austria, Egypt,

Ecuador, Roumania, Turkey, and Japan. With regard to the prolonged negotiations which had taken place in connection with the gas supply of St. Petersburg, a fresh Commission was to be appointed to visit the works in England. The Directors would, of course, be only too glad to welcome the Commission and furnish the members with the fullest information; and they felt confident that the Commission would decide on the desirability of adopting the coalite process, the more so in view of the considerable improvements that had been established lately in the new batteries erected at Wednesfield. The conclusion of definite agreements with certain groups with whom the Directors had been in negotiation, and which had to be deferred pending the completion of these alterations and improvements, could now be proceeded with. They were in touch with various groups who were anxious to complete definite arrangements with the Company for the acquisition of the patents for France and Germany; and the Indian negotiations had taken such definite shape that the prospectus of an Indian Company would be issued at an early date. Attention was directed in the report to the important scheme which the British Coalite Company were undertaking to utilize the gas for purposes of electrical power at Barking. During the last two years, it had been frequently said that, though coalite as a smokeless fuel was more than satisfactory, they would always have the greatest difficulty in disposing of the gas. The first answer made by the British Coalite Company was to enter into arrangements with local gas companies to take what gas could be supplied, leaving the Company to dispose of the coalite and the other bye-products. The second reply he could now make—and he made it with conviction—viz, that this gas, which unfriendly critics had described as their weakest factor, would not only prove to be one of the strongest financial links in their chain, but would be the means of effecting an absolute revolution in the cost of electricity. Sir William Preece, who was one of the highest authorities on electricity, told his shareholders that they would have a station at Barking which would enable them to supply power at a lower price than was charged anywhere in Europe. There could be no question that cheap electric power would be one of the most potent economic forces of the future, and that the companies who were able to supply it cheaply would stand in an unrivalled position. Mr. Percy Allen, the Chief Engineer of one of the largest chemical manufacturing firms in England, who was considered one of the foremost experts in the use of gas-engines for the production of electricity, was asked to report to the Directors of the British Coalite Company on the scheme at Barking; and his report confirmed the highest hopes of the Directors. He clearly demonstrated that as soon as the erection of the required number of units was completed and the gas-engines were provided, the Company would be in a position to produce electricity at such a low cost as would yield profits of a most substantial character. This report proved absolutely that the gas from the coalite process could be utilized to great profit for generating electrical power, in which latter direction there was an unlimited field. This power scheme at Barking was to be followed by others which would be developed on a large scale in different parts of the country and outside Great Britain. They held the world's patents. They could not rush a new industry, particularly one of a somewhat revolutionary kind; and they must not dispose of their valuable foreign patents unless they received in return a full and adequate price. That they had something unique to offer was now being appreciated abroad; and they looked forward with the utmost confidence to results in the very near future which could not but afford the greatest satisfaction to all who were interested in the Company.

After a brief discussion, the motion was carried unanimously.

ANTWERP WATER-WORKS COMPANY, LIMITED.

An Excellent Report.

At the Annual Meeting of the shareholders of this Company, an excellent report was laid before the shareholders by the Chairman (Mr. Easton Devonshire). It stated that the income, from all sources, amounted to £80,261, as compared with £78,712 for 1908; and after deducting working expenses, the cost of laying on services, and London expenses, there was a balance of £54,984. To this sum was added the undivided profit of £11,781 brought from last account, and interest on investments (£129), making a total credit of £66,894. Against this there had been charged debenture interest and income-tax for 1909; the contribution to the reserve account of 5 per cent. on net profits, as provided by the articles; the interim dividend of £16,500, at the rate of 11 per cent. per annum; the transfer to the sinking fund for the redemption of debentures of £1900, and for that of the share capital, £6250, and the Directors' extra remuneration of £2355. The sum of £31,606 was then left, out of which the Directors recommended that a balance dividend for the six months to Dec. 31 last, be paid at the rate of 11 per cent. per annum, free of income-tax (absorbing £16,500, and making a total dividend of 11 per cent. for the year), that a further sum of £10,000 be transferred to the reserve account, and that the balance of £5106 be carried forward.

In moving the adoption of the report and accounts, the Chairman first referred to the loss by death of Mr. Wilson, the Consulting Engineer, who had been with the Company for the past thirty years. In his place, the Board had appointed Mr. Courtney. Regarding the accounts, he thought the shareholders would agree that it was satisfactory that the Board had been able to increase the dividends by ½ per cent., as compared with 1908. At the same time, they had not had the enormous boom which they had last year, and which was largely due to the great quantity of water consumed by the State Railway. The railways had been using every possible means to economize; and they had been aided by the fact that it had rained most days. The bad weather had also considerably affected the consumption of water by the large meter consumers. The total revenue from this source had not diminished, but in the ordinary way it would have shown a substantial increase had the weather not been so excessively wet. The shipping returns had fallen off, and trade had not been good during the year. The falling off was partly accounted for by the fact that new docks had been in course of construction into which the ships were taken, and which the Company were unable to supply at the present moment. The Directors had decided to spend altogether £4000 in enlarging the mains which led directly into the docks, and for encircling the docks with supply mains and hydrants. A satisfactory feature was the steady increase in the number of ordinary customers. In this connection, they had added 1473 new contracts of the value of 72,000 frs. The extension of the town beyond the fortifications had now been begun in earnest; and there would be a great increase in building along the line of their trunk main, and to the greatest extent in the commune of Berchem. The shareholders had also probably noticed in the accounts that there had been overspent a considerable sum on capital account; but the Board had preferred to continue its policy of turning-over the Company's money, so to speak, in view of the altered situation that might occur if the Municipality purchased the works in 1911. As they had the cash available, they felt it would be desirable to postpone any further issue of debentures.

The motion was seconded by Mr. G. Evans; and it was agreed to. Subsequently the various recommendations as to the disposal of the available balance were passed; and other formal business was done.

RICHMOND GAS STOVE AND METER COMPANY, LIMITED.

Visit to the Works of Mr. E. W. Smith, M.Sc., of Leeds University.

The twentieth half-yearly conference of representatives of the Richmond Gas Stove and Meter Company was held at the works at Warrington last week, under the presidency of Mr. H. M. Thornton. Considerable extensions have been made to the works since the representatives last met together there; and after the various items on the *agenda* had been gone through, a visit (under the direction of Mr. J. A. Ransome) was paid to the new foundry at Grappenhall, which has been further enlarged recently. The new fitting shops, covering 2 acres, were also inspected; and the modern appliances and their general up-to-date appearance were much admired. The new premises will be finished in a few weeks. Of the 9 acres of ground recently purchased at Grappenhall, nearly one-half are now covered; and at the present rate of progress, the time when the whole will be occupied does not look far distant. Another department inspected was that devoted to furnace and industrial appliances, which, since its inception three or four years ago, has developed remarkably; many new types of furnaces and other apparatus for laboratory and industrial purposes having been added to the list of productions. As showing the wide range of inquiries received in this department, it may be mentioned that on the day of the visit one was in hand for a furnace for cremating lost dogs, and another for annealing bars of iron 12 ft. by 12 in. in constant succession—the novel feature of this furnace being that the waste gases were utilized to pre-heat the bars. The extension of the enamelling department was also seen, and the process of manufacturing the firm's patent "Porcellanite" fully demonstrated. The analytical laboratories were next visited; and the varied and valuable instruments installed some months ago were explained in detail.

An interesting variation of the usual programme of the conference was made on this occasion, in view of Professor Smithells's letter which recently appeared in the "JOURNAL" suggesting that the Research Committee should work in unison with the gas-stove manufacturers, and would welcome opportunities of visiting their works. Mr. E. W. Smith, the Research Chemist to the Gas Heating Research Committee of the Leeds University, was invited to meet the representatives of the Company; and he gave an interesting exposition of the scientific aspect of present-day gas-fires, and traced the history of their development. He dealt at some length with the difference between radiant heat and convected heat, and the effects of both on the human system. While, he said, the later patterns of present-day gas-fires conformed in many respects with the theoretical requirements, and efficiency had reached a high standard, there was still room for improvement.

A free discussion followed; and it is hoped that the interchange of ideas may be helpful, both to the Research Committee and to the manufacturers—thus conforming to the wish expressed by Professor Smithells as to the union between the practical and theoretical aspects of the question of gas heating.

At the conclusion of the conference, which lasted two days, the representatives and staff were entertained at dinner by the Company.

Local Government Board Inquiry at Leeds.

An inquiry on behalf of the Local Government Board was held by Mr. M. K. North last Tuesday into an application by the Leeds Corporation for sanction to borrow £3985 for the provision of new workshops for gas-works purposes. It was explained by the Town Clerk (Mr. R. E. Fox) that the new workshops were to take the place of those which were destroyed by fire some months ago in Meadow Lane. The old premises, however, had become much too small for the amount of business which was done in them; and the Gas Committee had already decided to have new premises which would be more convenient. The Corporation were well insured in respect of the old buildings, and had recovered a sum of £8810. Mr. Badlay said that he opposed the borrowing of the money for financial reasons. He opposed the "fatal facility" of borrowing powers given the city. If the old premises had been too small, and the fact had been known for some time, provision ought to have been made out of revenue for rebuilding. He thought that the money received as insurance might have been used for the purpose. Mr. Totty also called attention to the fact that the city "groaned under a debt of thirteen millions." The Inspector, however, pointed out that he was not there to consider general financial matters. In reply to Mr. Totty, Mr. R. H. Townsley, the General Manager of the Gas Department, said the Gas Committee would pay a rent of £268 a year to the Improvements Committee for the use of the land. The Gas Committee were not purchasing it.

Some days ago, Frederick Wynn committed suicide at Sheffield by inhaling gas through an india-rubber tube. He suffered from an incurable spinal complaint; and on different occasions had threatened to kill his wife and child, and to commit suicide.

DUNDALK ELECTRIC LIGHTING SCHEME.

Local Government Board Inquiry.

At the Town Hall, Dundalk, an inquiry was recently held by Mr. P. C. COWAN, the Chief Engineering Inspector of the Local Government Board for Ireland, into applications made for several loans by the Dundalk Urban District Council, one being for £20,000 to carry out an electric light scheme. Objections had been submitted on behalf of some ratepayers, on the following grounds: (1) That for a town of the size of Dundalk such an expensive scheme was not at all warranted; (2) that a syndicate failed to raise the necessary capital for a scheme for private purposes, and, if it was likely to result in profit, sufficient capital would have been raised without the slightest difficulty; (3) that no attempt had been made by public canvass or plebiscite to ascertain the number of people in favour of electric lighting; (4) that no attempt had been made to ascertain the number of people willing to become customers; (5) that similar undertakings had almost universally ended in loss; (6) the erection of public slaughter-house, public baths, provision of water supply and drainage were far more urgent; (7) the building trade is almost at a standstill in the town due to the heavy rates; (8) the town is amply provided with light and power.

Mr. T. M. HEALY, K.C., M.P., supported the application on behalf of the Council; Mr. MATHESON, K.C., appeared for the Dundalk Gas Comp any to oppose the application for the loan for electric lighting, which was also opposed by Mr. DONALDSON, Mr. JOHNSTON, and Mr. MAURICE MOLONY for some ratepayers.

Mr. HEALY said the electric lighting scheme had not been rushed at by the Council; and he was prepared to prove that it was rational, reasonable, and—having regard to modern civilization—necessary. The Council were unanimous as to it; and the people had had an opportunity of expressing their opinions not merely at one election, but at a series of elections. He would produce evidence to show that after two or three years, when the people got into their stride, the scheme would be a paying one. He did not at all object to the opposition; but it would be an intolerable thing that what they knew to be the central opposition—the Gas Company—should be duplicated to show the strength of popular feeling. When electric lighting schemes were introduced, gas companies looked out for new worlds to conquer and new homes to illumine; and in this way got customers which they otherwise would not trouble about. Dealing with the scheme, Counsel said it was proposed to expend £20,000 on it. The Council did not propose to borrow the money from the Treasury, but from a firm of brokers in Liverpool. The scheme, once established, would be a valuable addition to the life and civilization of Dundalk.

Mr. *M. Comerford*, the Town Clerk, was the first witness. He said the Council were practically unanimous in regard to the scheme. The gross rateable valuation of the town was £33,340 and a rate of 1d. in the pound would bring in £126 15s. 3d. He gave particulars of the different loans already obtained, amounting to £43,110, which left a chargeable debt of £13,153. Their net revenue was £2820. They paid about £627 annually for public lighting; and the general desire was for electricity.

In answer to the INSPECTOR, witness said the Council were charged by the Gas Company, in addition to the amount mentioned, about £40 for lighting the Technical School and Library, and £70 for lighting the municipal offices. The price of gas in Dundalk was 3s. 9d. per 1000 cubic feet. The Company owned the standards and fittings, and the Council the lampheads. The Company had undertaken to put incandescent burners on the lamps in the main streets.

In cross-examination by Mr. MATHESON, witness said the Gas Company offered to pay half the cost of new lampheads in a certain number of streets only; and they had to be requested several times before they put incandescent burners in the main street lamps. Messrs. Millar, Wilson, and Pegg were their Consulting Engineers; and it was their scheme which it was proposed to adopt. It had been submitted to several experts, including Sir A. B. Kennedy, and no objection had been raised. The Council had not taken any steps to ascertain the number of people who would have the electric light. The meetings at which different schemes were considered were held in committee, and were not open to the Press.

By Mr. DONALDSON: The Council had not published the schemes; but a Committee reported in detail on them, and this report was published in the local papers. The churches of the town with communities attached to them would take the electric light, as would also the Distillery Company. The Great Northern Railway Company told them that they would also take it if it was as cheap as gas.

In answer to Mr. JOHNSTON, witness stated that at the public meeting held in the Town Hall, which lasted about ten minutes, most of the councillors, three or four employees, and about a hundred ratepayers, were present. If there were two dozen outside who did not get in, it was their own fault.

Mr. *James M'Court*, the Chairman of the Council, said he had lived in the town for forty years as a business man, and he was of opinion that three-fourths of the people were in favour of the electric lighting scheme. The meeting in the Town Hall was not a bogus one. He waited for five minutes on that occasion, knowing there were some opponents of the scheme; but they were evidently waiting for a leader, and did not enter the hall.

By the INSPECTOR: He was of opinion that in the first three years there would be a loss of £400 or £500 on the scheme; but after that it would be a paying concern.

Mr. *T. W. Millar* said his firm were engaged on the electric lighting scheme, the estimate for which was £17,274, with £2000 for extension later on. He calculated as revenue £670 for public lighting and £2437 10s. for shop and private lighting; but he would not expect the latter figure for three years. Electricity at 6d. per unit would be cheaper than gas at 3s. 9d. per 1000 cubic feet. It was intended to charge 6d. per unit in Dundalk.

In cross-examination by Mr. MATHESON, witness said he had not done any town lighting in Ireland. He was not aware that there was a loss of £312 on the Londonderry electric lighting scheme; but the majority of these schemes in England were not worked at a loss. The cost of production in Dundalk would not exceed 1¼d. per unit. Three gas-engines of 150 H.P. would be required. He proposed to lay 11 miles of cable. The total running cost he estimated at £1750; and he added £600 in order to be on the safe side. The total number of units he estimated at 215,500.

After some further evidence in reference to the public meeting,

Mr. MATHESON addressed the Inspector on behalf of the Gas Company. He said that never in his experience had he seen a scheme introduced in more cavalier style on the part of the engineers propagating it. When he said this, he meant that it had been introduced without proper forethought. There were some things for which the District Council were justified in incurring expense, even though it might mean a loss to the ratepayers, such as water supply, sewerage works, &c. In the present instance, however, they were dealing with a well-lighted town. They were dealing with a town which, if the Council only co-operated with the Gas Company, would be better lighted without any additional expense. It was not a case in which the Council were justified in forcing a scheme upon the ratepayers or incurring expense, unless they thought and could show that it would be recouped. It struck him as most startling that in a town like Dundalk the rates were 7s. 8d. in the pound, and this scheme would impose an extra burden of 1s. for the first two or three years, and ultimately more. It was the duty of the Council to take precautions to see that the scheme would pay; and they had taken none. They had not inquired the number of people who would take electric light—whether there would be 500, 100, or 50. They might assume that all the enthusiastic and wealthy town councillors would get in the electric light as a first go-off; and they could pay for luxuries. The ratepayers, however, were people who, perhaps, could live comfortably, but who could not afford a luxury like electric light. His clients appealed to the Local Government Board not to impose the proposed burden upon the ratepayers.

Mr. *George Airth*, the Engineer and Manager of the Dundalk Gas Company, said the present price of gas for public lighting was 2s. 6d. per 1000 cubic feet; but deducting labour, cost of mantles, &c., they received 1s. 11d. They lighted the lamps for 3821½ hours per annum; and the gross price paid was £640. For private lighting the Company charged 3s. 9d. They introduced incandescent lights in 1899, and put in 50 fittings at a cost of 15s. 6d. each. They had since got 100 incandescent lights in the town, and several 600 and 400 candle-power lamps. They made an offer to supply the gas at the lowest price of any town in Ireland. The Company had been kept in the dark in regard to the electric lighting scheme, and he could not get any information with reference to it.

In cross-examination by Mr. HEALY, witness said that if the Council would guarantee that the electric lighting scheme would pay, the Gas Company would withdraw their opposition. Their valuation was £1200, and last year they paid £391 in rates.

Mr. *J. M. Cox*, a Director of the Company, said he was acquainted with the feeling of the people in regard to the question of the electric light; and there was no *bonâ fide* demand for it in the town. All the large ratepayers were opposed to electric lighting; and about half the population used oil. The estimate of 7000 lamps would appear to provide one for every man, woman, and child in the place. He did not think the people with oil-lamps would take electric light at 6d. per unit. The number who had gas and who would pay for the initial cost of putting in an electric installation would be very small. There was not, in his opinion, the remotest chance of the scheme paying for many years to come.

In cross-examination by Mr. HEALY, witness said the date of the Provisional Order of the Council was 1897, and the Board of Trade had threatened to withdraw it if it was not acted upon. There were some syndicates ready to proceed with the water-works scheme for the town, but none to take up the electric lighting scheme. Asked if the Council were unanimous as to the scheme, witness replied that he understood they were not very unanimous at a recent meeting.

Mr. DONALDSON then opened his case, and submitted that the scheme should never have been brought forward without proper inquiry. The overhead system proposed to be adopted would be very dangerous and unsightly.

Three well-known ratepayers having been called,

Mr. JOHNSTON said he represented one of the most prominent manufacturers, and one of the most important trades in the town—the building trade; and he would show that the electric lighting scheme was not one that was reasonably necessary. Moreover, Dundalk could not afford it. They had heard repeated *ad nauseam* remarks about the rates in the town; and he held that it was not reasonable that a blister of £20,000 should be further clapped on Dundalk.

After some further evidence, the inquiry closed with a vote of thanks to the Inspector.

GAS INSPECTION IN CANADA.

Proposed New Regulations.

Rather more than eighteen months ago, we noticed the first number of the "Gas Journal of Canada"—a monthly publication devoted to gas and water supply, sanitary matters, and public utilities, and the official medium of the Canadian Gas Association. The second number of the third volume has just reached us, and it bears evidence of the desire on the part of its conductors to make it useful to its readers. Among the contents is a Bill now before the Canadian House of Commons to amend the Gas Inspection Act. The following are some of its provisions.

By clause 1, section 3 of the Gas Inspection Act, 1906, is repealed, and the following are substituted therefor: "The Governor in Council may make such regulations, not inconsistent with this Act, as are necessary for giving effect to its provisions, and also regulations (*a*) as to the pressure under which gas is to be supplied; (*b*) in the case of inodorous gas, to require the addition of such substances as he deems necessary in

order to communicate odour; (*c*) to establish regulations for the testing of the calorific power of gas; (*d*) for defining the methods of making the tests prescribed by this Act and the places where such tests shall be made; and (*e*) for declaring the true intent and meaning of this Act in all cases of doubt."

The following provisions are substituted for those contained in section 7 of the 1906 Act: "In every district in Canada where gas is offered for sale, one or more inspectors of gas and gas-meters may be appointed by the Governor in Council, who shall have the custody of all measuring and testing apparatus and standards, and of all stamps and stamping apparatus supplied for use in the place for which he is appointed, hereinafter referred to as his district; and the inspectors so appointed shall verify all gas-meters, and test the purity of gas used in their respective districts, and shall stamp the meters when found correct, and grant certificates as to the quality of the gas, in such manner and in such form as are prescribed by regulations made under this Act. Any such inspector may, at all reasonable hours, enter any place within his district where any meter is used for measuring gas delivered to a purchaser, for the purpose of inspecting the meter so used." In place of section 19 is one authorizing the inspector to stamp as correct every meter which does not vary from the standard measure of gas more than 2 per cent. in favour of the seller or 3 per cent. in favour of the consumer.

According to the new section 31, "every undertaker in any district for which there is an inspector of gas shall be held to have undertaken that (*a*) the supply of gas shall be regular and sufficient; (*b*) that it shall be supplied under sufficient pressure; (*c*) that the quality of gas as to illuminating power, when tested in such manner as may be determined by departmental regulations, shall be equal to the standard established by the Governor in Council; (*d*) that the gas shall exhibit no trace of sulphuretted hydrogen, or any excess of sulphur and ammonia, when tested in accordance with regulations made by the Minister."

Section 34 of the Act is repealed, and the following is substituted: "A testing place or places shall be prescribed by the Department in every district for, or in respect of, which an inspecter of gas is appointed; and such testing-place shall not be less than 500 yards distant from the gas-house or premises where the gas is produced and purified, and not more than 100 yards from some point on some one of the main conducting pipes used for the distribution of the gas. Upon notice of the determination as to the location of such testing-place, every undertaker shall make the connections necessary to carry the gas from such gas-house or premises to such testing-place; and until such connections have been made to the satisfaction of the inspector, the selling of gas shall be illegal."

The following provisions relate to the purity and illuminating power of the gas: "Every undertaker, in districts in which the requisite apparatus is furnished by the Minister, shall obtain during the first weeks respectively of January, April, July, and October in each year, a certificate indicating the average quantity of ammonia, and sulphur in other forms than sulphuretted hydrogen, ascertained by official analysis during the preceding three months to have been contained in the gas. Every undertaker furnishing gas for illuminating purposes which exhibits traces of sulphuretted hydrogen, when tested in accordance with the rules provided in that behalf in the regulations made under this Act, shall incur a penalty for the first offence, if such undertaker has more than 8000 meters, of $60; if less than 8000 and more than 4000 meters, of $30; if less than 4000 and more than 1000, of $20; if less than 1000, of $10; and for every subsequent offence, double the above-named penalties. Every undertaker furnishing gas for illuminating purposes which exhibits ammonia, or sulphur in other form than sulphuretted hydrogen, in any greater quantity than is allowed by regulations made by the Minister, or which is below the standard quality as to its illuminating properties, shall incur a penalty for each and every day during and upon which such failure to comply with this Act occurs and continues, if such undertaker has more than 8000 meters, of $30; if less than 8000 and more than 4000, of $15; if less than 4000 and more than 1000, of $10; and if 1000 or under, of $5; unless such undertaker shows, to the satisfaction of the Minister, that the occurrence was attributable solely to accident which could not, by reasonable care and foresight, have been avoided."

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Glasgow Corporation Gas Consolidation Bill has been set down for consideration by a Committee of the House of Commons, which will meet on April 5. Mr. Mooney, a Nationalist Member, has been elected Chairman. On the afternoon of Tuesday last, a petition for additional provisions relating to the acquisition of the Baillieston Gas Company's undertaking was presented to the House of Commons. The matter will have to go to the Standing Orders Committee; and if they approve, the Committee on the Bill will have power, if they see fit, to add these new proposals.

A report upon the proposed introduction of stoking machinery into the Perth Gas-Works has been prepared and submitted to the Gas Committee. In the report, it is explained that it is not intended to remove any of the existing fixed plant, but that it is proposed to introduce mechanical stokers, the advantages of which are summarized thus: (1) More humane conditions of labour for the workmen; (2) retorts charged to their full capacity; (3) more gas per retort; (4) larger yields of gas coke, ammonia, and tar; (5) saving of coal; (6) less wear and tear upon plant; (7) less smoke and dust in the retort-house; and (8) reduction in working expenses. It is estimated that the total saving likely to be effected by the introduction of the machinery will amount to over £700 a year, and that the initial outlay would be about £3900. It is proposed to send a deputation from the Committee to visit Derby, Fulham, and Leicester, where different types of stoking machinery are in use, before the report is put before the Town Council.

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IS READY.

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A SUPPLY?

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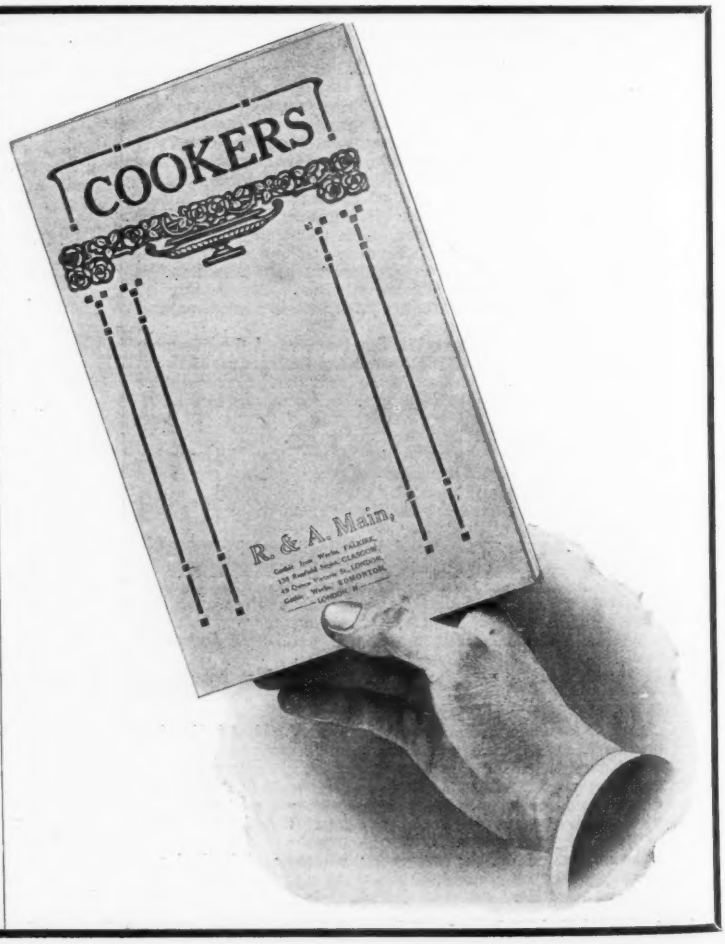


The Carluke Gas Company, Limited, are proceeding with some extensions of their gas-works, including the erection of a spiral-guided gasholder of 120,000 cubic feet capacity, prepared for telescoping, in a steel tank; also a new retort-house, with a bench of 35 retorts on the regenerative system. The plans for the work have been prepared by Mr. L. Hislop, of Uddingston.

An exhibition of gas appliances, promoted by the Montrose Gaslight Company, is being held this week in the Parish Church Hall, Montrose. It was opened on Monday by Mr. A. Muirhead, the Chairman of the Company, who said that the Directors readily concurred in the suggestion of the Gas Manager—Mr. A. Mackay—that an exhibition should be held. Mr. Mackay, it may be mentioned, was responsible for bringing together the collection of gas stoves, fires, and lighting appliances which are on view, and are of a quite up-to-date order. Lectures and cooking demonstrations have been given during the week by Miss E. M. Dods, late Principal of the Dundee School of Cookery.

An elderly lady named Mrs. Muirhead, who lives in Charterhall Road, Edinburgh, had a narrow escape from death by burning on the night of Saturday last. After she had retired for the night, a nephew who resided with her detected a smell of gas in the house. In his endeavour to locate the escape, he knocked at Mrs. Muirhead's bedroom door. The lady, when she came to open the door, unfortunately dropped the key, and then lighted a match to search for it. An explosion of gas took place inside the bedroom, by which the lady was thrown down and rendered unconscious. A fire broke out in the room. The old lady was rescued in an unconscious condition. She soon recovered, and was found to be suffering merely from shock.

As a sequel to the "Note" in last week's issue of the "JOURNAL," it may be stated that at another meeting of the Lerwick Town Council, Mr. Sinclair moved a resolution the effect of which was that when gas or other pipes are laid in the burgh, the work of relaying the roads or footways shall be done by the staff of the Burgh Surveyor, and charged for. The Council, by a majority, adopted the resolution.

The Income-Tax Question.—According to the "Daily Mail," the following legal opinion on the subject of the deduction of income-tax has been supplied to one of the principal London limited liability companies: "No income-tax has been imposed for the year 1909-10, no income-tax is at present recoverable for that year against the company; and therefore the company is not entitled to deduct from dividends paid income-tax thereon."

Shrewsbury Water Supply.—The Water Committee reported at the last meeting of the Shrewsbury Town Council that the improvements recently carried out to the Conduit and Severn water supplies had given such great satisfaction that it was generally recognized that the problem of the town's water supply, which had been before the Council for about thirty years, was at length solved. To provide for all necessary improvements in connection with the Severn supply, a further expenditure of £7084, for new mains, new engine, &c., was recommended. The report was adopted.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 24.

Sulphate of Ammonia.

Present requirements for export having evidently been filled, the tone has become much quieter, and some of the advance in prices has been lost. The demand for home consumption continues good, but that from consumers abroad has fallen away considerably; and the former has not been sufficient to maintain the strength of the market. At the close, quotations are £12 5s. per ton f.o.b. Hull, £12 7s. 6d. per ton f.o.b. Liverpool, and £12 10s. per ton f.o.b. Leith. In the forward position, makers are still quoting £11 17s. 6d. to £12 per ton f.o.b. at the best ports, without business resulting; and it is reported that there are speculative sellers over the distant months at less money.

Nitrate of Soda.

This article meets with rather less inquiry, but sellers are firm at 9s. 10½d. per cwt. for 95 per cent., and 10s. for 96 per cent. quality, on spot.

LONDON, *March* 24.

Tar Products.

The markets for tar products have remained firm during the past week. Pitch is very steady; and it is possible that we may see a further slight improvement for this season. Creosote is unchanged; and though there are not a great many orders in the market, sellers are not inclined to lower their ideas of price. Benzols and naphtha remain firm, and there are a good many inquiries in the market. As to crude carbolic acid, Continental consumers continue to report that they are purchasing at 11½d. to 11⅝d. per gallon f.o.b. English ports, and, in fact, some little business has been done at this figure for prompt delivery. Crystals do not show signs of improvement.

The average values during the week were: Tar, 15s. 9d. to 19s. 9d. *ex* works. **Pitch, London,** 31s. 6d.; east coast, 31s. to 31s. 6d.; west coast, 30s. to 31s. f.a.s. Mersey ports, and 30s. to 31s. others. **Benzol,** 90 per cent., casks included, London, 8d.; North, 7½d. to 7⅝d.; 50-90 per cent., casks included, London and North, 8½d. to 8¾d. **Toluol,** casks included, London, 10½d.; North, 9⅜d. **Crude naphtha, in bulk,** London, 4d. to 4½d.; North, 4d. to 4½d.; **solvent naphtha,** casks included, London, 1s. 3½d. to 1s. 4½d.; North, 1s. 2½d. to 1s. 3½d.; **heavy naphtha,** casks included, London, 11⅜d. to 1s. 0½d.; North, 10⅜d. to 11⅜d. **Creosote, in bulk,** London, 2⅝d. to 2¾d.; North, 2½d. to 2¾d. **Heavy oils, in bulk,** 2¾d. **Carbolic acid,** 60 per cent., casks included, east and west coasts, 11½d. **Naphthalene,** £4 10s. to £8 10s.; salts, 45s., bags included. **Anthracene,** "A" quality, 1½d. to 1⅝d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market continues firm, though the volume of business is not so great. Actual Beckton prompt is £12 10s.; and outside makes upon Beckton terms are £12 5s. In Hull, £12 5s. is asked; and in Liverpool, £12 7s. 6d. In Leith, £12 10s. is quoted; while in Middlesborough, £12 5s. is about the price.

A Convincing Comparative Test!!

We have just been handed a Report from an important Gas Company that after a *prolonged test* in ordinary everyday working, of our

The "SUN."

"SUN" Boiler

as against a Water-Heater of one of the "Circulator" Types, they found the "SUN" uses

half the amount of gas

used by the other Apparatus—in spite of the fact that the "SUN" was kept working constantly night and day.

JOHN WRIGHT & CO.,
Essex Works,
BIRMINGHAM.

232.

COAL TRADE REPORTS.

Northern Coal Trade.

The coal trade has been brisk; but the holidays have now limited the output very much. This and the doubtful prospect of the Welsh trade have stiffened prices, especially of steam coals, though the production has been heavier in the last few days. In steam coals, best Northumbrians have been quoted up to 12s. 9d. per ton f.o.b.; but there is no business of moment doing at this rate at present. Second-class steams are from 10s. 6d. to 11s.; and steam smalls are dearer—at from 7s. 6d. to 8s. In the gas coal trade, the change in price has not been so great, as the consumption of the great southern companies is now much less than it was at the turn of the year. Durham gas coals vary from about 10s. 6d. to 11s. 3d. per ton f.o.b., according to quality; but for "Wear specials," from 11s. 6d. to 11s. 9d. is quoted. A number of small contracts for gas coals are being arranged, at somewhere near the current prices. A contract has also been fixed, for between 15,000 and 20,000 tons, for the Walker Gas Company for twelve months, commencing in June; and it is said that the price is about 1s. 3d. per ton more than was paid last year. It is expected that some larger contracts will also soon be in the market. Coke is firmer; and gas coke is less plentiful. Good gas coke is about 14s. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

There is a continued demand for ell for export, as well as for local consumption. Prices are showing a disposition to improve, in anticipation of trouble in Wales. The prices now quoted are: Ell, 9s. 9d. to 10s. 6d. per ton. f.o.b. Glasgow; splint, 10s. 6d. to 10s. 9d.; and steam, 10s. to 10s. 6d. The shipments for the week amounted to 287,353 tons—a decrease of 22,635 tons upon the previous week, but an increase of 35,865 tons upon the corresponding week of last year. For the year to date, the total shipments have been 3,066,696 tons—an increase of 495,222 tons upon the corresponding period.

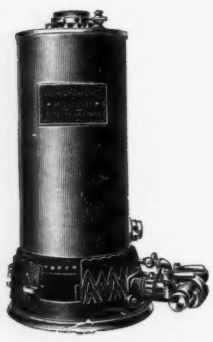
Gas Coal Contracts.

The Coal Trade correspondent of the "Liverpool Post" writes: "The Liverpool Gas Company are reported to have renewed all their contracts for twelve months from July 1 next, with collieries who are now supplying them, in Yorkshire, at advances of 9d. per ton. This is the same advance at which the Hull Corporation and the British Gaslight Company, who also have works at Hull, have recently renewed. These contracts have been taken at 9d. per ton advance on account of their being renewed so early in the season last year, under which conditions they did not obtain so large a reduction in price by 3d. per ton as renewals made later in the season—they obtaining a reduction of 6d. per ton, while the later renewals obtained 9d. The Gas Coal Colliery Owners' Association have agreed that all tenders sent in for renewals this year shall be at 1s. per ton advance on the prices quoted last season. Apparently the above exceptions have been made for the reasons stated. There is no doubt that in the past gas coals have been sold at far below prices in parity with house coal market quotations, with the result that gas has been proportionately cheaper, which, incidentally, tends to compete against house coals by the popular use of gas-stoves for heating and cooking.

Messrs. Glover and Main, Limited.

The annual meeting of this Company was held in London last Wednesday—Mr. R. T. Glover in the chair. The Directors recommended a dividend for the past year at the rate of 5 per cent. per annum on the preference share capital, and 4½ per cent. per annum on the ordinary share capital, compared with 5 and 3½ per cent. respectively for the year 1908. In moving the adoption of the report and balance-sheet, the Chairman reminded the shareholders that the turnover of the trading companies was very largely, though not exclusively, made up of the sales of meters and stoves. With regard to Messrs. Thomas Glover and Co.'s business, the volume of trade done last year was practically the same as that for 1908; but, taking into consideration the extension at their Birmingham branch, which was now for the first time under the direct control of one of the Directors (Mr. W. R. Glover), the total volume of trade showed a considerable increase. With reference to Messrs. R. & A. Main's business, the Directors had to report that their most sanguine anticipations in regard to orders received during 1909, and more particularly in the latter part of the year, had been more than realized; and, in spite of considerable extensions, principally in London, where a complete new foundry had been built and equipped within the last two years, they had been unable to cope with the demand. As a consequence, the Directors had decided to take immediate steps to double the fittings shop at Edmonton, and to extend still further the testing-rooms and laboratories attached to both works. As the shareholders were aware, full and ample provision for reserves and depreciation had been made in the trading companies' accounts. The only depreciation to be provided for by Messrs. Glover and Main, Limited, was on the freehold land and buildings owned by them. The report was adopted, and the dividends recommended were declared.

Trial of Improved Street Lighting in the Holborn District.—The Works and General Purposes Committee of the Holborn Borough Council, who have had under consideration the question of improving the public lighting of the borough, reported, at the meeting of the Council last Wednesday, that they had received a report from a Sub-Committee to the effect that they had had an offer from Messrs. Falk, Stadelmann, and Co., Limited, to fit some of the lamps in Hatton Garden with double incandescent inverted burners on trial, at cost price, and from Messrs. D. Anderson and Co. to make a similar trial of their "Dacolight," which was described in the "JOURNAL" for Dec. 7 last. The Committee recommended that the offers should be accepted; and this was agreed to. Messrs. Anderson's lamps will be on trial in Gower Street.



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Happy Independence of Coal

at uncomplainable cost and

TO GAS AUTHORITIES a steady permanent consumption.

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1. **EASY FIXTURE**—to present Pipes.
2. **UTMOST EFFICIENCY**—Water absorbs 97½% of Heat Value of Gas.
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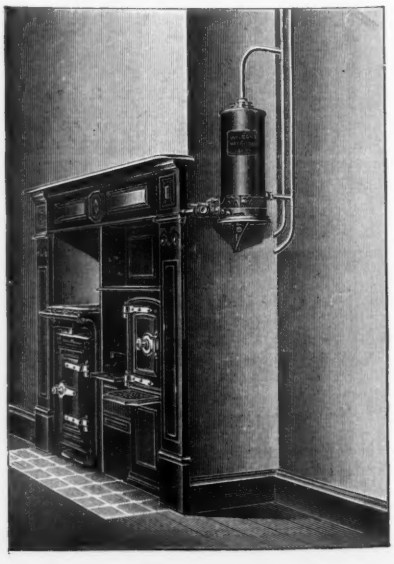
4. **GREAT DEMAND. THOUSANDS** in daily use, many constantly worked over 5 years and still going.



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WILSONS & MATHIESONS, LTD.,

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London Show-Rooms: 76, Queen Street, Cheapside, E.C.

Torquay Gas Company.

Mr. John Kitson presided at the annual meeting of the Torquay Gas Company last Tuesday, and in moving that the report and balance-sheet be adopted, he said the year's working had yielded good results. The sale of gas had reached 177,434,000 cubic feet, an increase of 3,370,000 cubic feet over 1908, which showed that the business was steadily increasing, notwithstanding the growing competition of the electric light. The total cost of manufacture was £21,442, compared with £24,775 in 1908—a reduction of £3333. An increase in the salaries account was due to the appointment of a district inspector, whose services were appreciated by the consumers, many of whom had had their fittings examined and put in order. A bonus of £372 had been given to the staff and employees to mark the jubilee of the Company. On the sale of gas, there was an increase of £360, which was especially gratifying in view of the fact that the price had been reduced from 3s. to 2s. 11d. per 1000 cubic feet. The total receipts were £36,746, and the expenditure £28,563, leaving a balance to the profit and loss account of £7912, which compared with a balance of £6415 in 1908. After payment of the full dividends and the interest due on loans, there was a balance of £467 to be carried forward. The unaccounted-for gas had been reduced to less than 5 per cent. The report and balance-sheet were adopted, and dividends of 10 per cent. and 7 per cent. on the two classes of shares declared. In Torquay the most unsatisfactory lighting was that along the Torbay Road, which was done by electric arc lamps. Thanks were accorded the Chairman, Directors, and officials; and for the latter Mr. R. P. Kitson (the Secretary), Mr. R. Baynon (the Engineer and Manager), and Mr. J. Duckworth (the Accountant) replied.

Devon Gas Association, Limited.—Mr. F. Templer Depree (Chairman of Messrs. Willey and Co.) presided at the annual meeting of this Association, which was held last week in Exeter. The Association have recently acquired the gas-works at North Tawton, and they now own six works in all. The concern is making steady progress, and placing itself in a sound financial position. The Chairman reported that the work of the year had been satisfactory; and a dividend of 5 per cent. was declared.

The New Issue of Capital by the Hornsey Gas Company.—In accordance with the announcement which recently appeared in our advertisement columns, Messrs. A. & W. Richards offered for sale, at the Mart, Tokenhouse Yard, E.C., last Tuesday, £5000 of consolidated stock, £6500 of 5 per cent. preference stock, and £3000 of 4 per cent. perpetual debenture stock of the Hornsey Gas Company. The whole of the ordinary stock was sold at from £190 to £192 per £100, the preference stock at from £116 10s. to £118, and the debenture stock at from £100 to £100 10s.; the total amount realized by the sale being £20,182 10s.

Maryborough (Queensland) Gas Company, Limited.—In addition to the reports of Colonial gas undertakings noticed last week (p. 826), we have received that of the Maryborough Gas Company for the six months ended Dec. 31 last. In this period they received £3410 from the sale of gas, fittings, &c., and there was a balance of £1036 on the profit and loss account. The Directors recommended that out of it should be paid a dividend at the rate of 6 per cent. per annum, amounting to £773; leaving £263 to be carried forward. A contract has been entered into for the erection of three generator settings of retorts and a retort-house governor, at a cost of £1733. They are of the most modern type, and will, it is anticipated, greatly economize the cost of production. They are expected to be at work at the date of the next half-yearly meeting.

Improved Public Lighting in Wandsworth.—At the meeting of the Wandsworth Borough Council last Wednesday, the Highway Committee reported that they had had under consideration a letter from the South Metropolitan Gas Company, suggesting that the lanterns and burners for new erections should be taken from existing lamps at the corners of some of the principal streets, and that in place thereof the Company's latest inverted burner lamps which give 50 per cent. more light at the same cost, should be fixed, the extra charge for such lamps to be 3s. each, to cover the cost of labour; the expense of the lantern and burner being borne by the Company. In a further letter, the Company stated that an inverted burner had been fitted to the lamp in front of the Council House. A report from the Borough Engineer on the experimental use of the new inverted burners near the Council House was read, and it was finally decided that in future, in the part of the borough supplied with gas by the South Metropolitan Company, inverted burners shall be fitted to all new lamps, as well as to existing lamps which are altered in any way.

The accounts of Sir William Arrol and Co. for the past year show an available sum, including £9495 brought forward, of £15,394. After providing for the preference dividend, £3168 remains to be carried forward.

The Sittingbourne Urban District Council have received a letter from the Local Government Board sanctioning the Council's application to borrow £550 for the installation of a suction gas plant at the water-works.

Orders have been received by Messrs. Joseph Taylor and Co., of Bolton, for solid plate lead saturators, to be fitted with double detachable ammonia pipes, detachable acid, and detachable steam pipes, for the Yorktown and Blackwater Gas Company and the Londonderry Gas Company.

At the twentieth ordinary general meeting of Stewarts and Lloyds, held in Glasgow last Wednesday, the Chairman (Mr. J. G. Stewart), in moving the adoption of the report and statement of accounts, noticed in the "JOURNAL" for the 8th inst., stated that the conditions of trade which prevailed during 1909 were most adverse to the Company's operations. Business was restricted; and every order was the subject of extreme competition. They were only able to keep the works running by accepting contracts at prices which, in some cases, could not be regarded as profitable. They managed, however, to keep the works totally employed; and, on the whole, the results of the year's trading were better than had been anticipated.

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General Offices and Works: WARRINGTON.

In the "JOURNAL" for the 15th inst., some particulars were given from the report of Messrs. C. & W. Walker, Limited, for the past year. In moving its adoption at the annual meeting last Wednesday, the Chairman (Mr. J. F. Wright) said that, in view of the depression in trade in 1909, and the keen competition they had had to meet, he thought the increased profit shown in the balance-sheet must be considered as very satisfactory. During the last few years they had spent a good deal of money in putting down new machinery, and generally in equipping the works on more modern lines. They had thus been able to secure contracts which formerly they could not have undertaken; and the result had been the increased profits made during the past few years. They had by no means come to the end of this expenditure; and they now contemplated spending a further considerable sum with the object of facilitating production and at the same time cheapening its cost. With regard to the future, it was rather early to say anything definite as to their prospects; but the contracts already in hand seemed smaller than last year, and unless trade improved to a considerable extent, he was afraid they could hardly expect to see such good results obtained as during last year. There was, however, a considerable amount of work about at the present time, and a more hopeful feeling that trade was distinctly improving. The report was unanimously adopted.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

ENGINEER AND MANAGER. Sittingbourne Gas Company. Applications by April 7.

CLERK OF WORKS AND MANAGER AND SECRETARY. No. 5209.

ENGINEER AND MANAGER. Stone Gas Company. Applications by April 6.

Plant, &c. (Second Hand), Wanted.

PURIFIER, &c. Sanderson, Edinburgh.

Gas-Works for Disposal.

LAINDON GAS-WORKS. By Auction. April 12.

Stocks and Shares.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY. April 5.

HORLEY GAS COMPANY. April 5.

LOWESTOFT WATER AND GAS COMPANY. April 5.

SEVENOAKS WATER COMPANY. April 2.

SOUTHEND WATER COMPANY. April 19.

WORTHING GAS COMPANY. April 5.

TENDERS FOR

Coal and Cannel.

STOURBRIDGE GAS DEPARTMENT. Tenders by April 12.

Fire-Clay Goods.

COLWYN BAY AND COLWYN URBAN DISTRICT COUNCIL. Tenders by April 9.

General Stores—

(Oils and Paints, Lime, Ironmongery, Brass Fittings, &c., Taps, Valves &c.)

COLWYN BAY AND COLWYN URBAN DISTRICT COUNCIL. Tenders by April 9.

Incandescent Goods.

COLWYN BAY AND COLWYN URBAN DISTRICT COUNCIL. Tenders by April 9.

Meters.

COLWYN BAY AND COLWYN URBAN DISTRICT COUNCIL. Tenders by April 9.

Oxide (Spent).

BOURNEMOUTH GAS AND WATER COMPANY.

Patent Licenses.

MANTLE MAKING MACHINES. Haseltine, Lake, & Co., Southampton Buildings, Chancery Lane, W.C.

Pipes.

COLWYN BAY AND COLWYN URBAN DISTRICT COUNCIL. Tenders by April 9.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 862.

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,474,000	Stk.	Oct 14	5	Alliance & Dublin Ord.	86–88	..	5 13 8
310,000	Stk.	Jan. 13	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
200,000	5	Oct. 28	7†	Bombay, Ltd.	6⅞–6⅞	..	5 5 8
40,000	5	,,	7†	Do. New, £4 paid	5–5¼	..	5 6 8
50,000	10	Feb. 25	15	Bourne- } 10 p.c.	29–30	..	5 0 0
311,810	19	,,	7	mouth Gas } B 7 p.c.	16½–16¾	..	4 3 7
75,000	10	,,	6	and Water } Pref. 6 p.c.	15–15½	..	3 17 5
380,000	Stk.	,,	12½	Brentford Consolidated	250–253	..	4 18 10
300,000	,,		9⅜	Do. New	187–189	..	5 0 6
50,000	,,	Aug. 12	5	Do. 5 p.c. Pref.	120–122	..	4 2 0
206,250	,,	Dec. 29	4	Do. 4 p.c. Deb.	101–103	..	3 17 8
220,000	Stk.	Mar. 16	11	Brighton & Hove Orig.	213–216*	..	5 1 0
246,320	,,	,,	8	Do. A Ord. Stk.	151–154*	+1	5 3 11
467,000	20	Oct. 14	10⅝†	British	45–46	+½	4 14 4
109,000	Stk.	Feb. 25	6	Bromley, A 5 p.c.	116–118	..	5 1 8
165,700	,,	,,	4½	Do. B 3½ p.c.	87–89	..	5 1 2
82,278	,,	,,	5½	Do. C 5 p.c.	103–105	..	5 4 9
55,000	,,	Dec. 29	3½	Do. 3½ p.c. Deb.	87–89	..	3 18 8
500,000	10	Oct. 14	7	Buenos Ayres (New) Ltd.	14¾–15¼	..	4 11 10
250,000	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	98–100	..	4 0 0
100,000	10	—	—	Cape Town & Dis., Ltd.	4–5	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	6–7	..	—
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	49–50	..	6 0 0
100,000	Stk.	Dec. 29	4½	Do. 4½ p.c. Deb. Stk.	86–88	..	5 2 3
157,150	Stk.	Feb. 25	5	Chester 5 p.c. Ord.	105–108	..	4 12 7
1,513,280	Stk.	Feb. 25	5⅞	Commercial 4 p.c. Stk.	106–108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	103–105	..	4 15 3
475,000	,,	Dec. 29	3	Do. 3 p.c. Deb. Stk.	81–83	..	3 12 3
800,000	Stk.	Dec. 10	5	Continental Union, Ltd.	98–100	+1	5 0 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	138–140	..	5 0 0
492,270	Stk.	—	5	Derby Con. Stk.	121–123	..	4 1 4
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
145,995	,,	Oct. 2	5	East Hull 5 p.c. Ord.	98–100	..	5 0 0
486,093	10	Jan. 27	12	European, Ltd.	24½–24¾	..	4 17 0
354,060	10	,,	12	Do. £7 10s. paid	18½–19	..	4 14 9
15,141,545	Stk.	Feb. 10	4⅝	Gas } 4 p.c. Ord.	103–104	..	4 9 8
2,600,000	,,	,,	3⅜	light } 3½ p.c. max.	88–90	..	3 17 9
3,799,735	,,	,,	4	and } 4 p.c. Con. Pref.	103–105	..	3 16 2
4,193,975	,,	Dec. 29	3	Coke } 3 p.c. Con. Deb.	80–82	−1	3 13 2
258,740	Stk.	Mar. 16	5	Hastings & St. L. 3½ p.c.	93–95*	..	5 5 3
82,500	,,	,,	6⅓	Do. do. 5 p.c.	117–119*	..	5 9 3
70,000	10	Sep. 29	11	Hongkong & China, Ltd.	17⅛–18	..	6 2 3
131,000	Stk.	Mar. 16	7	Ilford A and C	145–147*	+3	4 15 3
65,782	,,	,,	5⅜	Do. B	108–110*	+2	5 0 0
65,500	,,	Dec. 29	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
£			p.c.				£ s. d.
4,940,000	Stk.	Nov. 11	8	Imperial Continental	178–180	+1	4 8 11
1,235,000	Stk.	Feb 10	3⅛	Do. 3½ p.c. Deb. Red.	93–95	..	3 13 8
195,242	Stk.	Mar. 16	6	Lea Bridge Ord. 5 p.c.	120–122*	..	4 18 4
561,000	Stk.	Feb. 25	10	Liverpool United A	222–224	..	4 9 3
718,100	,,	,,	7	Do. B	163⅛–165½	..	4 4 7
306,083	,,	Dec. 29	4	Do. Deb. Stk.	103–105	..	3 16 2
75,000	5	Nov. 26	6	Malta & Mediterranean.	4¼–5	..	0 0 0
560,000	100	Oct. 1	5	Met. of } 5 p.c. Deb.	59–102	..	4 18 0
250,000	100	,,	4½	Melbourne } 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 11	3½	Monte Video, Ltd.	12¾–13¾	..	5 5 8
1,775,892	Stk.	Feb. 25	4⅛	Newc'tle & G'tesh'd Con	104–105	..	4 3 4
529,435	Stk.	Dec. 29	3½	Do. 3½ p.c. Deb.	91–93	..	3 15 3
55,940	10	Feb. 25	7	North Middlesex 7 p.c.	12¾–13¾	..	5 5 8
300,000	Stk.	Nov. 26	8	Oriental, Ltd.	139–141	..	5 13 6
60,000	5	Sep. 10	8	Ottoman, Ltd.	6⅛–6⅝	..	6 5 6
31,800	53	Feb. 25	13	Portsea Island A.	134–136	..	5 1 0
60,000	50	,,	13	Do. B.	126–128	..	5 1 7
100,000	50	,,	12	Do. C.	119–121	..	4 19 2
114,800	50	,,	10	Do. D and E.	100–102	..	4 18 0
398,490	5	Oct. 28	7	Primitiva Ord.	7⅞–7¼	..	4 8 11
796,980	5	Jan. 27	5	Do. 5 p.c. Pref.	58–58	..	4 8 11
488,903	100	Dec. 1	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
1,000,000	10	Oct. 14	8	River Plate Ord.	17¾–18¼	..	4 7 8
312,650	Stk.	Dec. 29	4	Do. 4 p.c. Deb.	99–101	..	3 19 3
250,000	10	Sep. 29	9†	San Paulo, Ltd.	15⅝–16¼	..	5 10 9
62,500	10	,,	6	Do. 6 p.c. Pref.	11¾–12¾	..	4 18 0
125,000	50	Jan. 3	5	Do. 5 p.c. Deb.	50–51	..	4 18 0
135,000	Stk.	Sep. 10	10	Sheffield A	233–235	..	4 5 1
209,98	,,	,,	10	Do. B	233–235	..	4 5 1
523,500	,,	,,	10	Do. C	233–235	..	4 5 1
70,000	10	Oct. 14	10	South African	12¼–12¾	..	7 16 11
6,429,895	Stk.	Feb. 10	5/9/4	South Met., 4 p.c. Ord.	120–122	..	4 9 7
1,895,445	,,	Jan. 13	3	Do. 3 p.c. Deb.	81–83	..	3 12 3
209,820	Stk.	Mar. 16	8	South Shields Con. Stk.	157–158*	..	5 1 3
605,000	Stk.	Feb. 25	5⅜	S'th Suburb'n Ord. 5 p.c.	121–123	+1	4 12 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	119–121	..	4 2 8
117,058	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	121–123	..	4 1 4
502,310	Stk.	Nov. 11	5	Southampton Ord.	110–112	..	4 9 3
120,000	Stk.	Feb. 10	6⅞	Tottenham } A 5 p.c.	133–135	..	5 1 9
453,940	,,	,,	5⅜	and } B 3½ p.c.	112–114	..	4 14 4
149,470	,,	Dec. 29	4	Edmonton } 4 p.c. Deb.	59–101	..	3 19 3
182,380	10	Dec. 29	8	Tuscan, Ltd.	9¼–9⅝	..	8 4 2
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	99–101	..	4 19 0
236,476	Stk.	Feb. 25	5	Tynemouth, 5 p c max.	112–114	..	4 7 9
255,636	Stk.	Feb. 25	6⅜	Wands- } B 3½ p.c.	139–141	..	4 14 0
79,416	,,	Dec. 29	3	worth } 3 p.c. Deb. Stk.	74–76	..	3 18 11

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GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Thornhill, DEWSBURY.

GAS TAR wanted,
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Specialty of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

AMMONIA Waste Liquor Disposal.
Purification Plant.
Results Guaranteed. No Working Costs.
JOHN RADCLIFFE, Chemical Engineer, EAST BARNET.

APPLICATIONS FOR APPOINTMENTS.
DO you appreciate how much success depends on well-considered and lucid presentment of your qualifications? I make a Specialty of the Preparation of Applications, and am continually receiving complimentary letters from clients. Write now for Particulars.
HERBERT GREATOREX, Beechwood, MATLOCK.

TO GAS MANAGER'S OR GAS ENGINEER'S SON.
SUITABLE Man Wanted to Act as CLERK OF WORKS during Erection of an 8 Million Cubic Feet Works, Take Charge of Laying Mains and Services, and later on to Act as MANAGER and SECRETARY. Preference will be given to one investing a fair amount in Shares. Splendid Prospects.
Apply, by letter, stating Age, Experience, and Wages, to No. 5209, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ROBERT DEMPSTER & SONS, Ltd.,
Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

THE Sittingbourne District Gas Company require the Services of an Experienced ENGINEER and MANAGER for their Gas-Works.
He must be capable of Designing and Superintending the carrying out of Extensions, and Competent to undertake the Entire Control of the Works, Mains, and Services, the Supervision of the Manufacture of Gas and Sulphate of Ammonia, and the Testing of Gas.
Salary £180, with Residence, Coal, and Gas free.
The duties to commence the 1st of June next.
Applications, stating Age, Experience, present Employment, &c., accompanied by *copies* of not more than Three recent Testimonials, to be sent to the undersigned on or before the 7th of April next.
E. H. Goldfinch,
Secretary.
Sittingbourne, March 24, 1910.

STONE, STAFFORDSHIRE.

WANTED, a Gas Engineer and MANAGER of the Works belonging to the Stone Gaslight and Coke Company, Limited.
Candidates must have a Practical Knowledge of the Manufacture and Distribution of Gas and be able to prepare Plans and Specifications for any New Works.
The person appointed must devote the whole of his time to the Duties and be able to keep, with assistance, the Books. He will be required to act as Secretary to the Company.
Canvassing not allowed and will disqualify.
Commencing Salary, £160 per Annum.
Applications, marked "Gas Manager and Secretary," stating Age and Experience with *copies* of Three recent Testimonials, to be sent not later than Wednesday, April 6, to John Kendrick, Esq., Chairman, Stone Park, Stone, Staffordshire.

WANTED, a Purifier, Second-Hand, about 6 ft. by 4 ft. by 3 ft., with Valves, Connections, and Lifting Apparatus.
Address K. Sanderson, 23, Rutland Street, Edinburgh.

CAST-IRON Pipes. Spigot and Socket or Flanged. Special Quality—9 feet or 12 feet Lengths. When buying, Write us.
A. Lowcock, Limited, Shrewsbury.

FOR SALE—A Quantity of Hurdle GRIDS, 3 ft. 6 in. high, in perfect Condition; mostly new. Cheap for immediate Sale.
Apply to Firth Blakeley, Sons, and Co., Ltd., Thornhill, Dewsbury.

GASHOLDERS - Splendid 45 feet diameter and New STEEL TANK, fixed Complete to Plan and Specification; also 14 feet and 16 feet Diameter GASHOLDERS, with STEEL TANKS. Can be seen temporarily erected. Re-erected Cheap for immediate Sale.
Firth Blakeleys, Thornhill, Dewsbury.

URBAN DISTRICT COUNCIL OF STOURBRIDGE.
(Gas Department.)

THE Gas Committee invite Tenders for the Supply of about 20,000 Tons of Good Screened GAS COAL, delivered on their Gas-Works.
Forms of Tender may be had on Application to the undersigned, and only Offers on our own Form will be considered.
Tenders, endorsed "Gas Coal," addressed to the Chairman of the Gas Committee, to be sent to me at the Gas-Works, Stourbridge, on or before Tuesday, April 12, 1910.
The Contract will contain a Fair Wages, &c., clause.
The lowest or any Tender not necessarily accepted.
By order of the Committee,
Charles H. Webb,
Engineer and Manager.
Gas-Works, Stourbridge,
March 18, 1910.

URBAN DISTRICT COUNCIL OF COLWYN BAY AND COLWYN.

GENERAL GAS STORES.

TENDERS are invited for the Supply of the following STORES and MATERIALS, in such Quantities as may be required in the Gas Department of the above Council, for the Year ending the 31st of March, 1911—viz:
Fire-Clay Goods, Lime, &c.
Iron Tubes and Fittings.
Lead and Compo.
Iron and Steel.
Oils and Paints.
Brass Fittings and Sundries.
Slot Fittings.
Dry Meters.
Main Taps.
Steam Valves.
Castings.
Incandescent Lighting Goods.
Ironmongery.
Form of Tender and any Information may be had from the undersigned, to whom sealed Tenders, endorsed "Tenders for Gas Stores," addressed to the Council Offices, Colwyn Bay, must be delivered not later than Saturday, the 9th of April next.
The Tender of any person who, personally or through an Agent, Canvasses any of the Officers or Members of the Council will be rejected.
The Committee do not bind themselves to accept the lowest or any Tender.
By order,
James Amphlett,
Clerk to the Council.
Council Offices, Colwyn Bay,
March 17, 1910.

SPENT OXIDE.

THE Bournemouth Gas and Water Company invite TENDERS for about 800 Tons of SPENT OXIDE f.o.b. Poole, Dorset.
Samples and Particulars on Application to the General Manager, Gas-Works, Bournemouth.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 18, Finsbury Circus, E.C.

By order of the Directors of the
LOWESTOFT WATER AND GAS COMPANY.

NEW ISSUE OF 400 ADDITIONAL ORDINARY £10 SHARES,
AND
£1000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 5, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

NEW ISSUE OF £32,000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 5, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
WORTHING GASLIGHT AND COKE COMPANY.

NEW ISSUE OF £3473 CONSOLIDATED ORDINARY STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 5, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

HORLEY DISTRICT GAS COMPANY.

£250 "A" CAPITAL STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 5, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

In the High Court of Justice, Chancery Division,
Mr. Justice Joyce. 1909, L. No. 1586.
THE FREEHOLD GAS-WORKS
OF THE
LAINDON AND DISTRICT GASLIGHT, COKE AND WATER COMPANY, LIMITED,
Situate about 23 miles from London, within a short distance of the Laindon Station on the London, Tilbury, and Southend Railway. The Works comprise: **Retort House** with Eight Retorts, Vertical Condenser, Cast-Iron Scrubber, Tar-Tank and Pump, Two Purifiers, with Lifting and Traversing Apparatus, **Gasholder, 400-Light Station Meter,** together with the Mains, Services, Meters, and Tools, the whole **to be sold** as a **Going Concern** and with **Possession on completion of the purchase.**

MR. WILLIAM RICHARDS, of the Firm of **MESSRS. A. & W. RICHARDS** (the person appointed by the said Judge), will SELL THE ABOVE BY AUCTION, at the Mart, London, E.C., on Tuesday, April 12th, at **One** o'clock, precisely in One Lot.
The Works may be viewed, and Particulars with Conditions of Sale obtained, of J. Montague Haslip, Esq., Solicitor, 6, Martin's Lane, Cannon Street, E.C.; of Harry Barker, Esq., Chartered Accountant, 6, Old Jewry, E.C., and of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 1000 NEW ORDINARY FIVE PER CENT. MAXIMUM £10 SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 19, at Two o'clock, in Lots.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

SEVENOAKS WATER-WORKS COMPANY.

NOTICE is Hereby Given, that the Sevenoaks Water-Works Company, in pursuance of their Provisional Order of 1908, as confirmed by Act of Parliament, being desirous of increasing their Capital, have resolved to issue Three Hundred 4 PER CENT. PREFERENCE SHARES of TEN POUNDS each.
Tenders are hereby invited from the Public for the same at not less than par value.
The present issue of Capital is made to provide for the Extension of Mains and other works, and also for the Repayment of Sums over-expended on Capital Account.
The Company are paying the Maximum Dividend on their Stock and Ordinary Share Capital.
Tenders are to be addressed to the Company at their Offices, Oak Lane, Sevenoaks, on or before Saturday, the 2nd day of April, 1910, and endorsed "Tender for Shares."
The Shares are Payable as under—viz.:
£2 on Application,
£3 on Allotment,
and the Balance on the 1st day of July, 1910.
Where no Allotment is made, the Deposit will be returned in full.
Forms of Tender on Application at the Company's Offices.
By order of the Board,
Alfred Grainger,
Secretary.
Offices: Oak Lane, Sevenoaks,
March 9, 1910.

THE Proprietors of the Patents Nos. 24,218 of 1901 and 83 of 1901, for "IMPROVEMENTS relating to MACHINES FOR THE MANUFACTURE OF MANTLES EMPLOYED IN INCANDESCENT LIGHTING" and "IMPROVEMENTS relating to MACHINES FOR THE MANUFACTURE OF INCANDESCENT GAS MANTLES," are desirous of entering into Arrangements, by way of LICENSE and Otherwise, on Reasonable Terms, for the purpose of EXPLOITING the same and ensuring its Full Development and Practical Working in this Country.
All Communications should be addressed in the first instance to Haseltine, Lake, and Co., Chartered Patent Agents and Consulting Engineers, 7 & 8, Southampton Buildings, Chancery Lane, London, W.C.

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Sir John Cass Technical Institute,
JEWRY STREET, ALDGATE, E.C.

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By CHARLES A. KEANE, D.Sc., Ph.D., F.I.C.
A Course of Practical Work suited to the requirements of those engaged in Chemical and Metallurgical Industries. Wednesday Evenings, 7 to 10 p.m. Commencing **Wednesday, April 20, 1910.**

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PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
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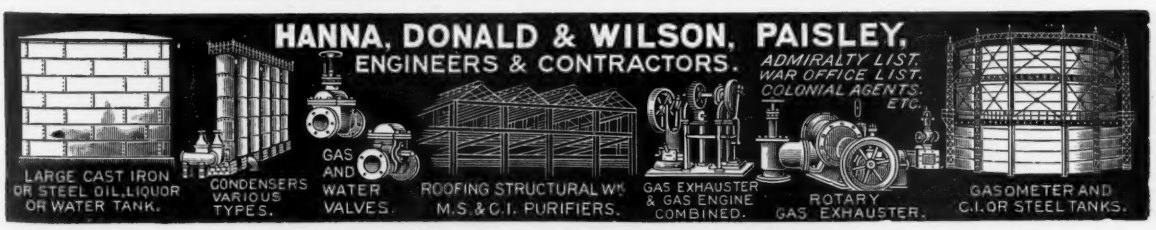

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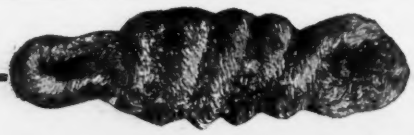

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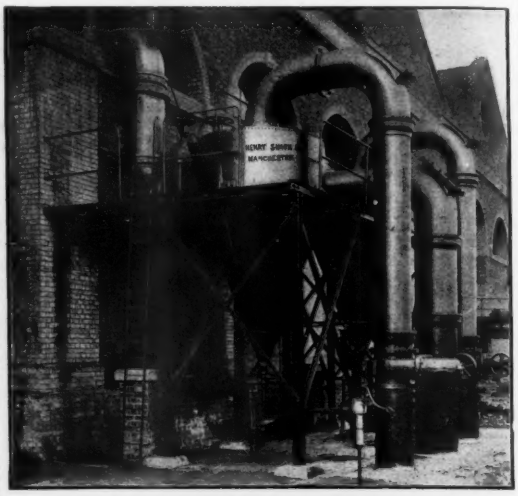

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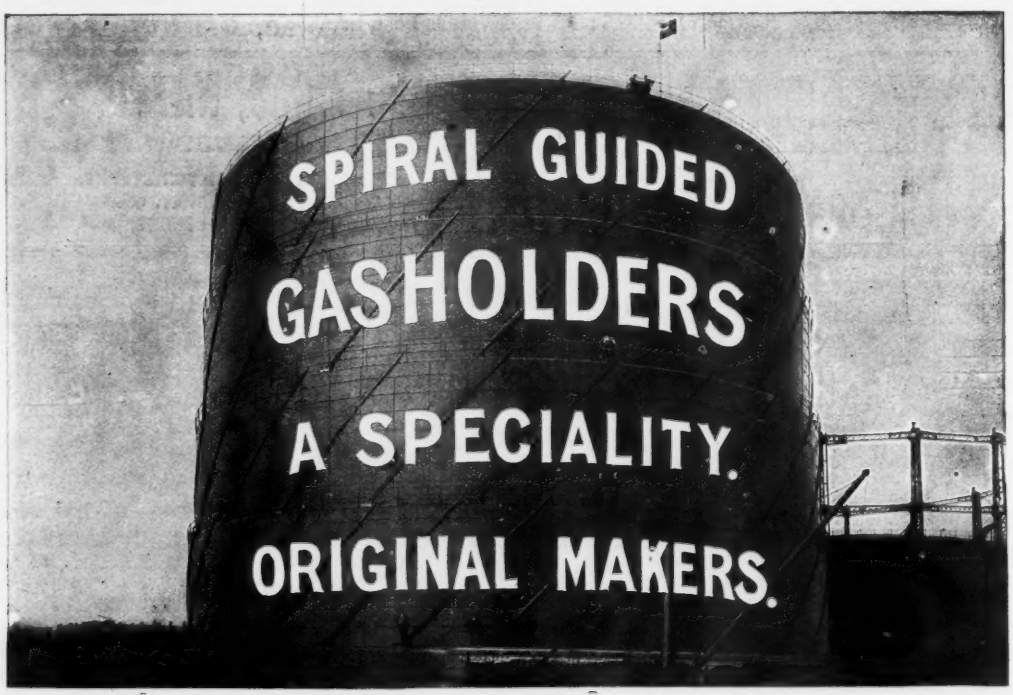

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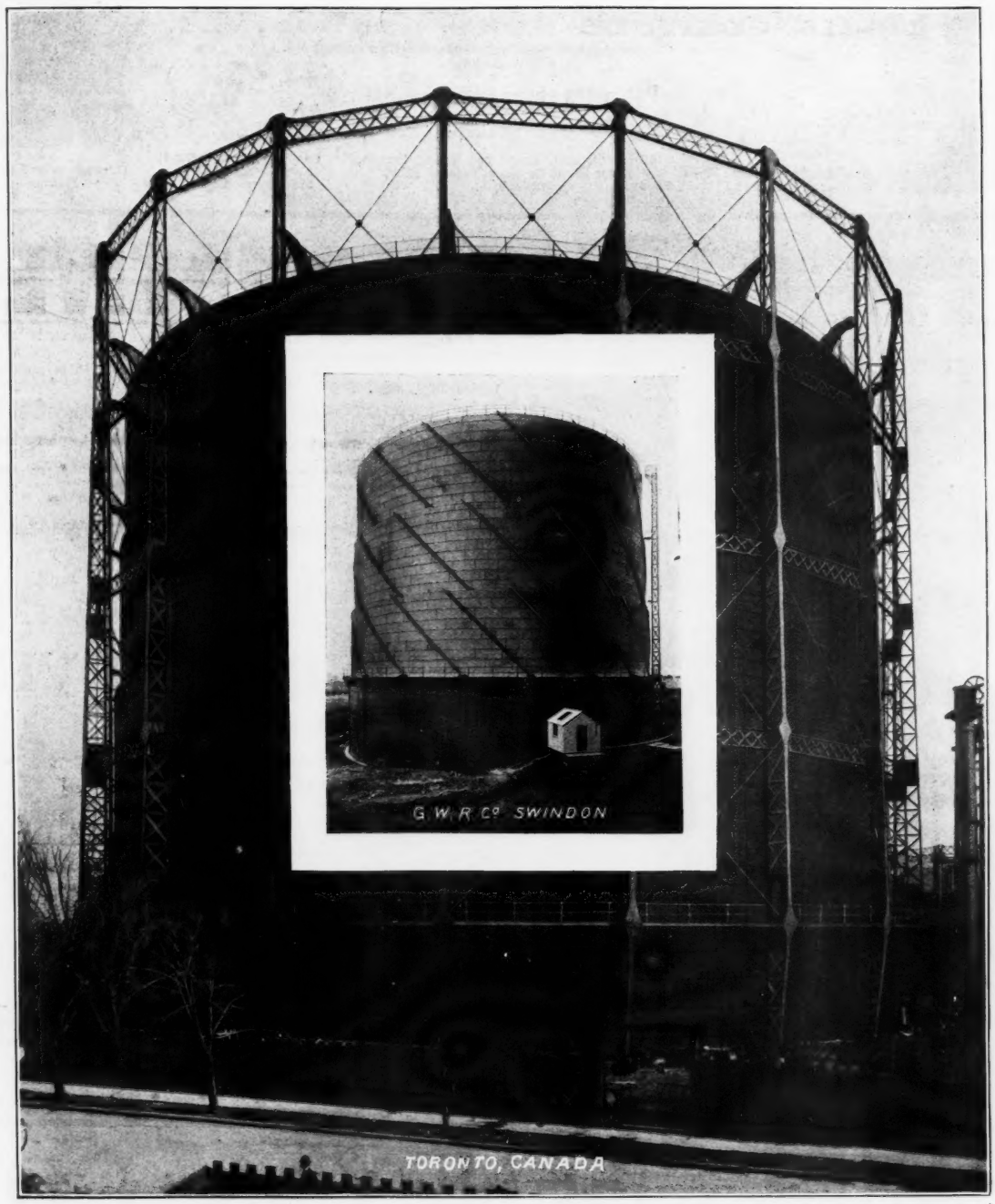

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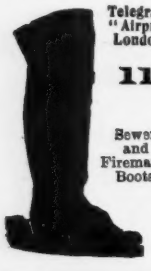

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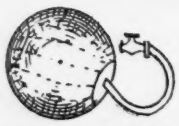

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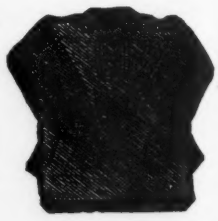

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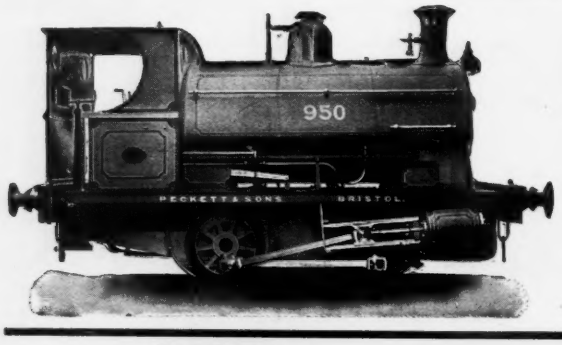

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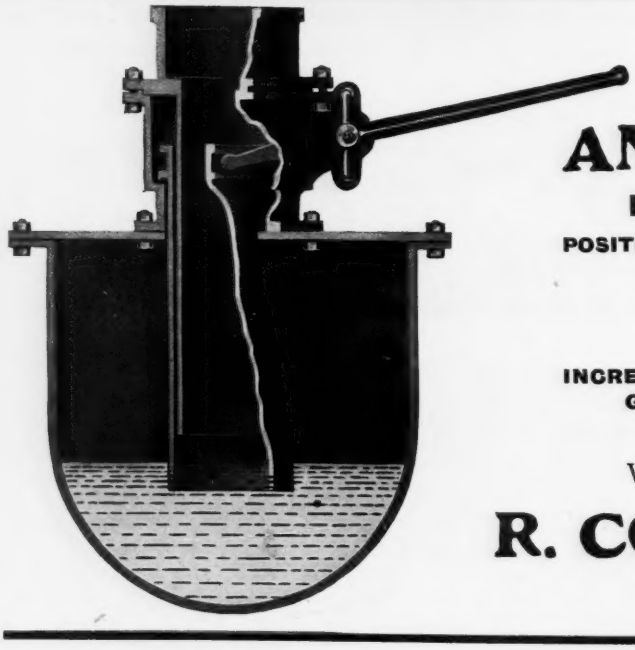

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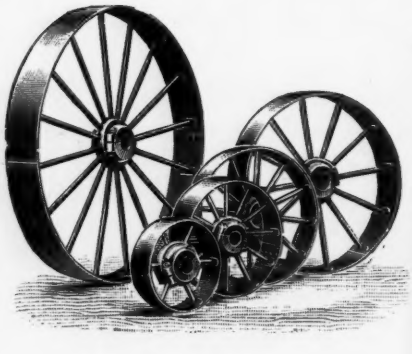

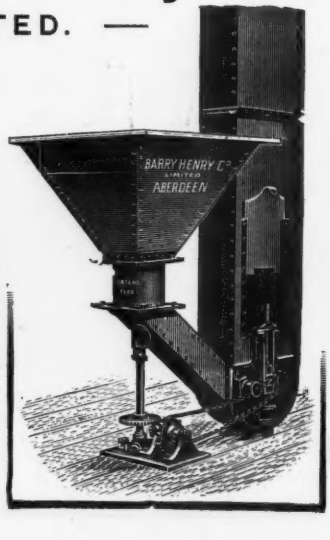

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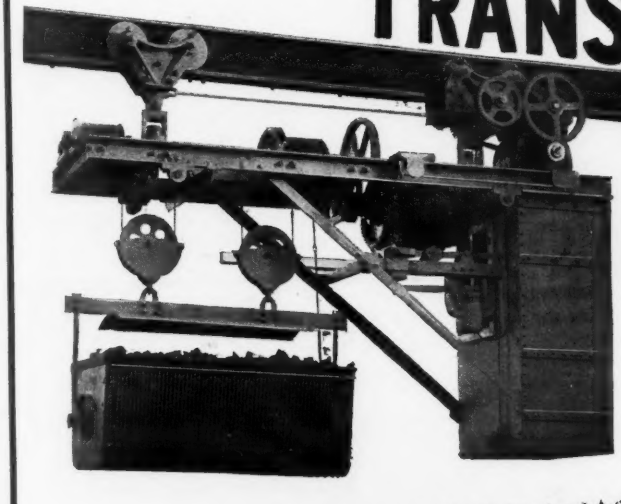

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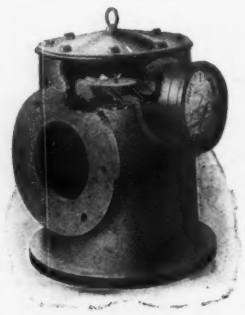

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Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·20.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS SHEFFIELD."

Welsbach
LIGHT
Inverted Arc Lamp, Fig. 623.

Storm Proof—
For Exterior Lighting.

Welsbach-Kern
(Patent) Inverted System

BRITISH MADE.

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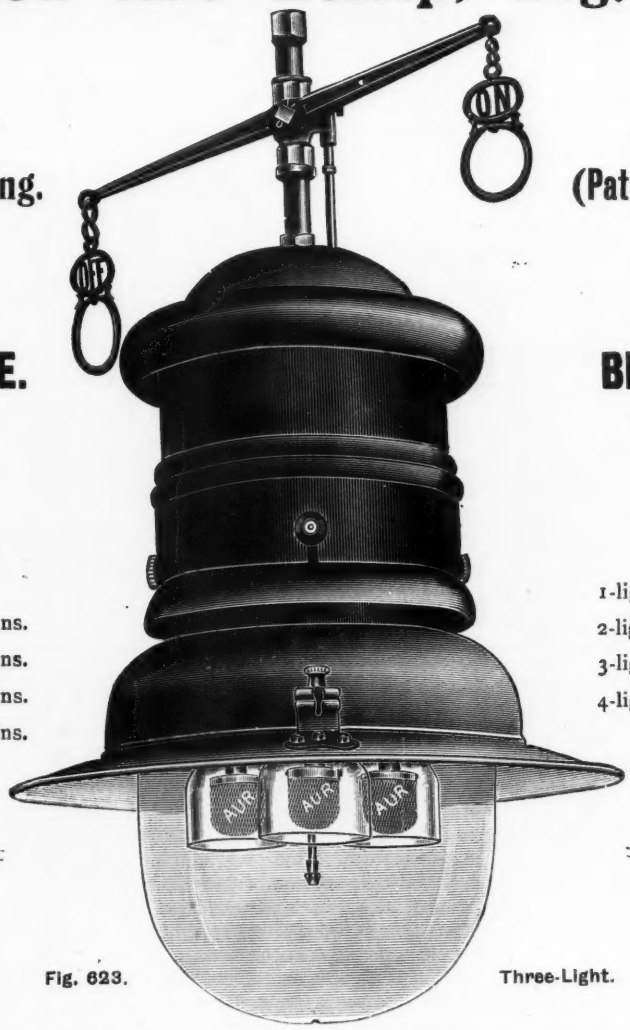

Fig. 623. Three-Light.

Height over all.

1-light . . .	1 ft. 8 ins.
2-light . . .	2 ft. 4 ins.
3-light . . .	2 ft. 4 ins.
4-light . . .	2 ft. 7 ins.

Width over all.

1-light . . .	1 ft. 1 in.
2-light . . .	1 ft. 5 ins.
3-light . . .	1 ft. 5 ins.
4-light . . .	1 ft. 8 ins.

ENAMELLED Green Steel Casing, fitted with Welsbach-Kern Inverted Burners, Gas and Air Regulators operated from outside. Sliding Door to give access to Burners for cleaning purposes. Fitted with Magnesia Nozzles, Welsbach Mantles, and Glass Mantle Protectors. Complete as shown. Highly efficient and regenerative.

	Gas per hour.	*C.P.*	*Steel.*	*Copper Case.*
1-light	4 feet	125	**30/-**	**5/-** extra.
2-light	8 feet	260	**47/6**	**6/-** extra.
3-light	12 feet	400	**52/6**	**6/-** extra.
4-light	16 feet	550	**72/6**	**9/-** extra.

All on or off, or One light on and the rest off, **7/6** per Lamp extra. Cup and Ball, **3/6** per Lamp extra.

RENEWALS.

Glass Mantle Protectors (Fig. 623) **3/4½** per dozen, or in case lots of 5 gross, **33/-** per gross.

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Clear Glass Globes, each	**2/3**	**5/9**	**5/9**	**9/-**
" " " In Case lots per dozen.	**19/6**	**57/9**	**57/9**	**93/-**
Case contains . .	*80*	*18*	*18*	*12*

	1-Light.	*2-Light.*	*3-Light.*	*4-Light.*
Wired Globes, extra each	**2/-**	**2/-**	**2/9**	**3/6**
Parabolic Reflector, extra "	**3/6**	**6/-**	**7/6**	Not made

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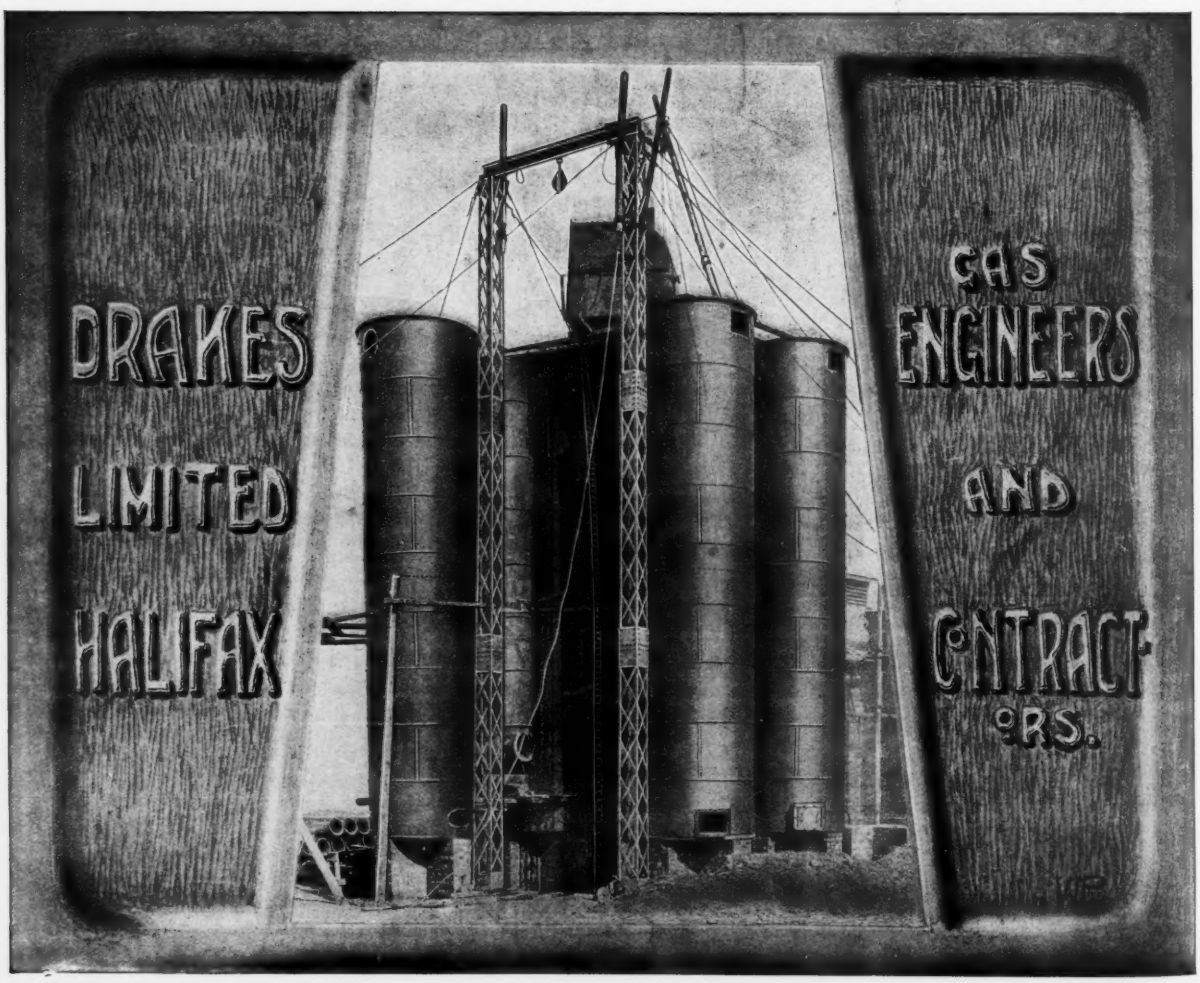

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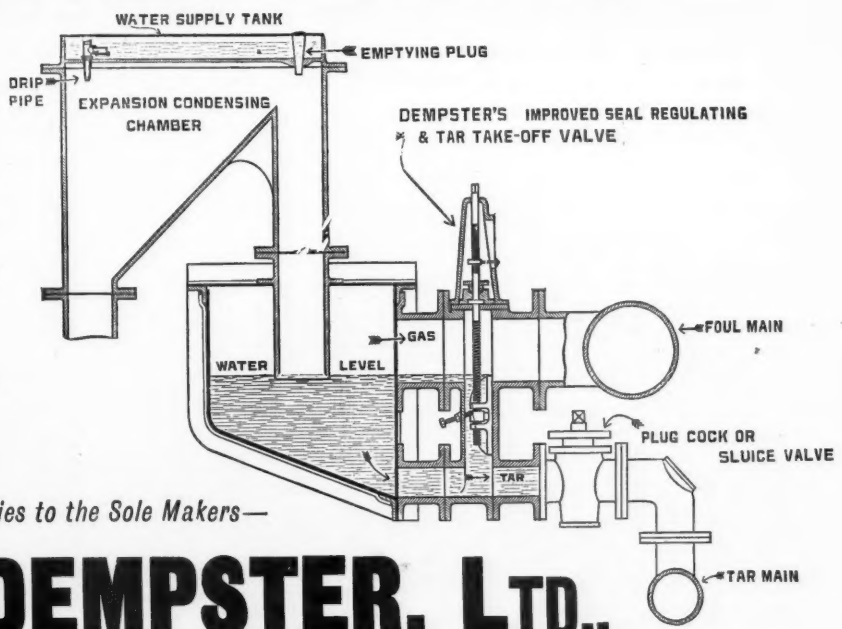

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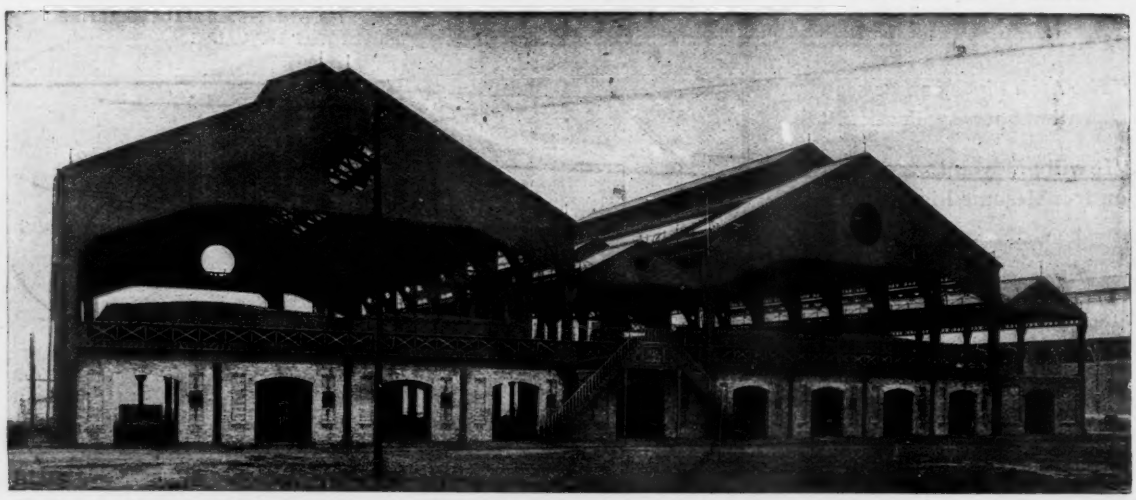

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